FEDERAL SYSTEMS INTEGRATION MARKET

1989 - 1994

INPUT

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INPUT provides planning information, analysis, and recommendations for the information technology industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions.

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Federal Information Systems and Services Program (FISSP)

Federal Systems Integration Market, 1989-1994

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Abstract

INPUT estimates that the federal government market for systems integration contract opportunities will increase from $2.7 billion in 1989 to $6 billion by 1994, at a compound annual growth rate of 18%.

This update of the 1988 systems integration report presents the results of research and analyses of various operational aspects and strategies of the integration market. The many changes in this update include the following:

- An updated forecast of the systems integration market, including current and out-year funding
- A revised list of open opportunities and recent awards
- An update of the competitive trends and market share of major systems integration vendors
- Case studies of systems integration contracts
- An examination of the current issues affecting federal government systems integration vendors
- The exclusion of turnkey systems from the scope of this report

This report contains 160 pages, including 44 exhibits.

Table of Contents

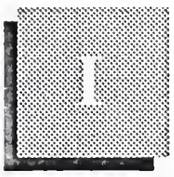
Table of Contents (Continued)

Table of Contents (Continued)

Table of Contents (Continued)

Exhibits

Exhibits (Continued)



Introduction

The Federal Systems Integration Market, 1989-1994 is a revision of an earlier report issued in December 1988. It has been revised in response to continuing client interest in this changing market. The 1989 update identifies market issues and trends that affect vendors and systems integration contractors entering the market through FY 1994. Current contractor guidance and insight into the latest agency requirements and perceptions are offered to help vendors plan their strategies to compete for federal systems integration contracts during the 1989-1994 period.

This report on systems integration activities focused on the federal government, and was prepared as part of INPUT's Federal Information Systems and Services Program (FISSP). Reports issued through this program are designed to help INPUT's U.S. industrial clients in planning how to satisfy future federal government needs for computer-based information systems and services. The report's findings are based on research and analyses of several sources, including the following:

- INPUT's Procurement Analysis Reports (PARs)
- OMB/GSA/NIST Five-Year Information Technology Plans for 1989-1994
- Interviews with leading federal systems integration contractors
- Interviews with federal agency officials who manage existing systems integration contracts
- Interviews with prime contractors of existing systems integration contracts
- Federal agency GFY 1990 Information Technology Budgets

A

Scope

The period covered in the report is GFY 1989-GFY 1994. At the writing of this report, GFY 1990 has just begun.

Vendor interviewees were selected because they were either identified as contractors of record for existing systems integration contracts, or listed as systems integration services vendors in INPUT's Vendor Analysis Program data base for 1989. The case studies were made for systems integration projects, identified through previous INPUT Procurement Analysis Reports (PARs), or suggested in conversations with clients. In order to obtain complete case study examples of awarded systems integration projects, INPUT interviewed both agency program managers and representatives of the prime contractor of record on a specific project.

For the purposes of the 1989 study, INPUT defined "systems integration" to encompass the following categories of vendor products and services (see Appendix F for detailed explanations of each category):

- Equipment
- Software Products
- Professional Services (during contract)
- Design/Integration
- Software Development
- Education/Training and Documentation
- Operation and Maintenance (during contract)
- Systems Operations (during contract)
- Other Products/Services

Unlike earlier INPUT studies of the systems integration market, this report excludes turnkey systems as a product category in the definition of systems integration products and services.

B

Methodology

The OMB/GSA/NIST Five-Year Plan analysis for the INPUT Procurement Analysis Report was reviewed for programs to be initiated during the GFY 1989-GFY 1994 period. INPUT also researched agency long-range plans for major systems replacements and new system initiations (new starts) for the same time.

INPUT developed a questionnaire for vendor respondents, designed to acquire summary data on programs awarded to systems integration contractors. All case study examples were at least one year into the contract life cycle.

C

Report Organization

This report consists of five additional chapters:

- Chapter II is an executive overview describing the major points and findings in the report.
- Chapter III provides the market analysis and forecast, and describes the major market issues and trends affecting the industry.
- Chapter IV summarizes federal agencies' requirements of systems integration contractors and includes case study examples of systems integration projects.
- Chapter V presents the vendors' perspectives on the federal systems integration market, and short company profiles on this market segment's players.
- Chapter VI provides a sample of business opportunities, presented by programs and initiatives in the federal market, that anticipate seeking the services of a systems integrator contractor.

Several appendixes are also provided:

- Interview Profiles
- Definitions
- Glossary of Federal Acronyms
- Policies, Regulations, and Standards
- Related INPUT Reports
- Questionnaires

A description of INPUT and its programs and services follows the appendixes.

II

Executive Overview

A

Federal Market Pressures

Prospects for systems integration (SI) continue to improve in both federal and commercial markets. The government will continue to spend more on systems integration projects, although fewer new projects will be initiated. Some of the pressures affecting this growth are listed in Exhibit II-1. The federal SI projects now require more "bang for the buck" than ever.

EXHIBIT II-1

Federal Market Pressures

- Improve productivity of operations
- Consolidate and improve aging systems
- Overcome staff shortages
- Maintain fair competition of contracts
- Share implementation risks
- Criticisms of the "Grand Design" Concept

Many federal government agencies are faced with a tightening budget and a need to improve service to their users. The government must improve productivity within its own operations. New and improved information technology will provide a partial solution to this problem.

New information technology will also make existing systems obsolete. The government still has systems based on 1960s technology, and they must be replaced. Many such systems will be consolidated with the implementation of a completely new system. Even relatively small systems requirements are sometimes met through total integrated solutions. With SI, agencies achieve their objectives while sharing implementation risks with outside vendors.

For more than 10 years, federal personnel policies and pay rates have driven out most of the junior technical talent. Highly proficient technicians can usually obtain better pay, benefits, and working conditions by moving to the private sector. This fuels continued strong growth in the federal SI market as agency executives rely increasingly on contractors to perform most technical functions.

In order to ensure fair competition, the government has enacted many laws and regulations, which have delayed the acquisition of systems and postponed many SI projects. The government is ushering in new programs to speed up the process, but these are new and unproven.

Finally, in 1988 GSA issued a report criticizing large "grand design" systems integration projects. The report provoked thought and discussion as to the feasibility of large systems integration projects and any possible alternatives. In December 1989, GSA is due to publish a sequel in which it will probably describe its alternatives to the grand design concept. If the administration and agency executives agree, the future of large systems integration projects may well be in jeopardy.

B

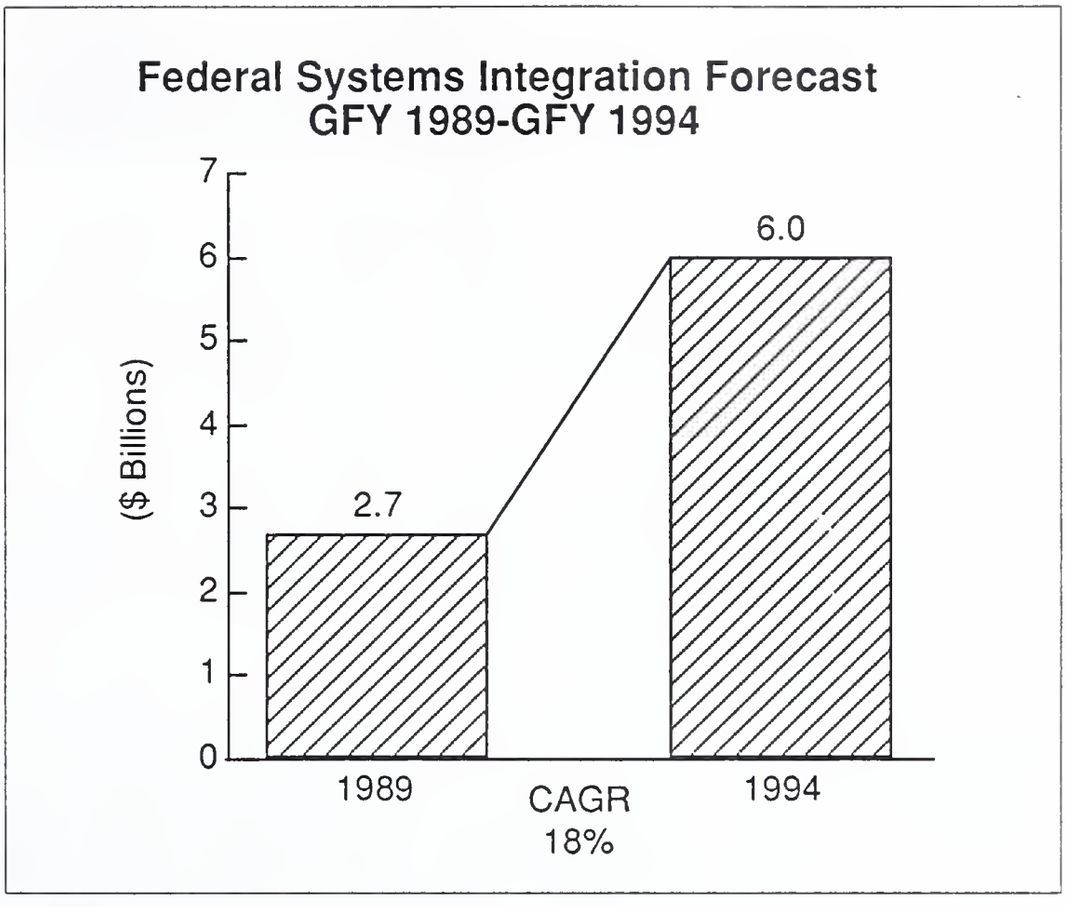
Market Forecast

INPUT expects the federal systems integration market to grow from $2.7 billion in GFY 1989 to $6 billion in GFY 1994, at a CAGR of 18%. This growth rate is virtually identical to last year's, but some of the components which make up this forecast have shifted, resulting in lower out-year expenditures.

In the past, computer equipment commanded the largest share of the federal SI market. This has changed recently, however, as a result of declining hardware prices, more efficient components, and sharp cuts in agency equipment budgets, especially on the defense side. Increasing SI expenditures go for professional services, and INPUT expects this shift to continue over the next five years.

As with last year, the relative decline in the equipment share of SI expenditures reflects a slow growth rate (5%) and agency intentions to obtain better functioning equipment for their money. The improved availability of applicable software products will also enable many agencies to realize this objective.

EXHIBIT II-2



C

Competitive Forces

In today's market, nearly every federal vendor claims some sort of systems integration experience, but few actually are what they say. At the time when VAR business was trendy, many of these companies called themselves VARs. Now some of these same vendor organizations call themselves systems integrators.

INPUT developed its listing of top SI vendors (the first five of which appear in Exhibit II-3) based on interviews, primary and secondary research efforts, and analysis of information from the Federal Procurement Data Base.

There are no significant surprises among the top five vendors, but it must be remembered that these represent only prime contractors. Much of the SI revenue for EDS and CSC is actually subcontracted to IBM, so IBM is probably realizing far more federal SI revenue than any other company. These rankings usually shift from one year to the next, depending on who wins the major contracts.

EXHIBIT II-3

Leading Federal Systems Integration Vendors

- IBM
- Electronic Data Systems
- Computer Sciences Corporation
- SAIC
- Grumman Data Systems

D

Federal Systems Integration Opportunities

Although many federal SI vendors focus their efforts on the Department of Defense (DoD), INPUT found more solid opportunities on the civilian side of the federal government (see Exhibit II-4). Although the count does not reflect the entire market, it does represent the relative interests of defense versus civil agencies. These are based on a search of INPUT's PAR data base; the opportunities represented are thus solid and likely to occur.

EXHIBIT II-4

Systems Integration Opportunities by Type of Implementation, FY 1989-FY 1994

Type of Implementation	Agencies		
	Defense	Civilian	Total
Upgrade/Expansion	10	11	21
Replacement	2	5	7
New start	8	11	19
Total	20	27	47

The statistics show the dominance of civilian agencies in the SI market. The Air Force is tied with the Department of the Treasury for the greatest number of identified opportunities. The Navy, HHS, and the Army also have a greater number of identified opportunities than other agencies.

Upgrades and expansion opportunities are more prevalent than other types. The number of new starts grew from last year, while the number of replacement opportunities decreased. These facts reflect the federal need to strengthen and enhance many existing systems, which in turn reveals the continuing shortcomings of these systems.

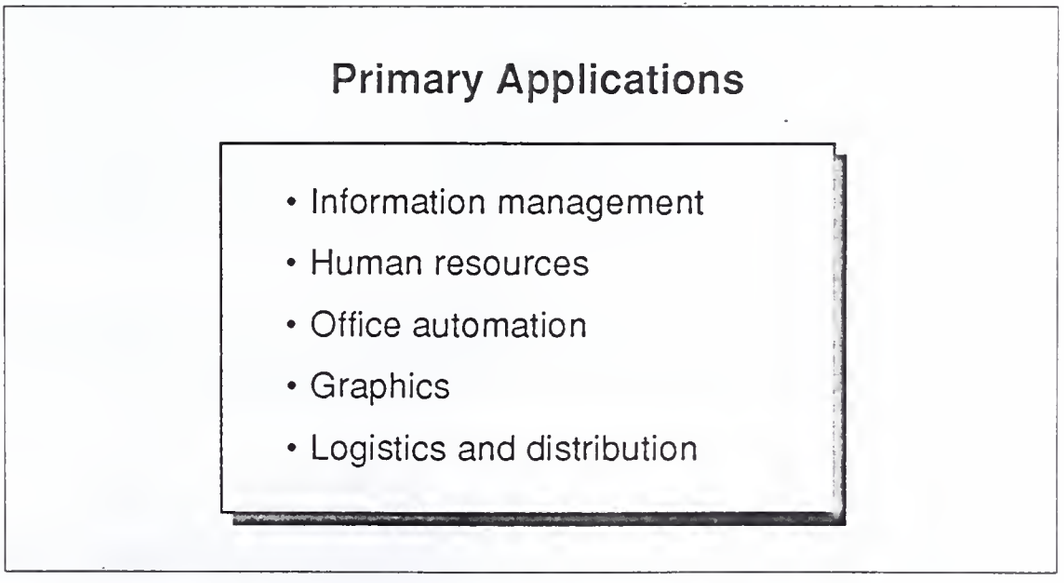
In terms of individual system costs, the civilian agencies again will expend more than the defense agencies. However, the defense agencies do have some very significant opportunities planned, such as the Army's Small Multi-User Computer contract and the Navy's CAD/CAM II project. They are potentially long-term, high-value contracts. Depending on the sequestration of the FY 1990 budget and the outcome of conference committee meetings, several other major SI opportunities may come to fruition or may be delayed.

E

Primary Applications

Information management for analysis and the sharing of data is the most frequent application for upcoming SI programs. These programs are most often applied to mission-critical areas. Mission-oriented systems would include an accounting system for the Air Force Accounting and Finance Center, an information management system for DCA, and a distributed information system for the U.S. Geological Survey.

EXHIBIT II-5



Human resources and office automation also constitute significant portions of the applications in systems integration projects. Graphics applications opportunities, involving both data displays and mapping, will increase in a number of agencies. The USDA Geographic Information System is a major SI opportunity in which graphics is the primary application.

The Department of Defense frequently mentions logistics and distribution systems as important applications. The defense agencies also need systems in accounting and procurement.

Other applications include the following:

- Management systems
- Administration
- Project Management

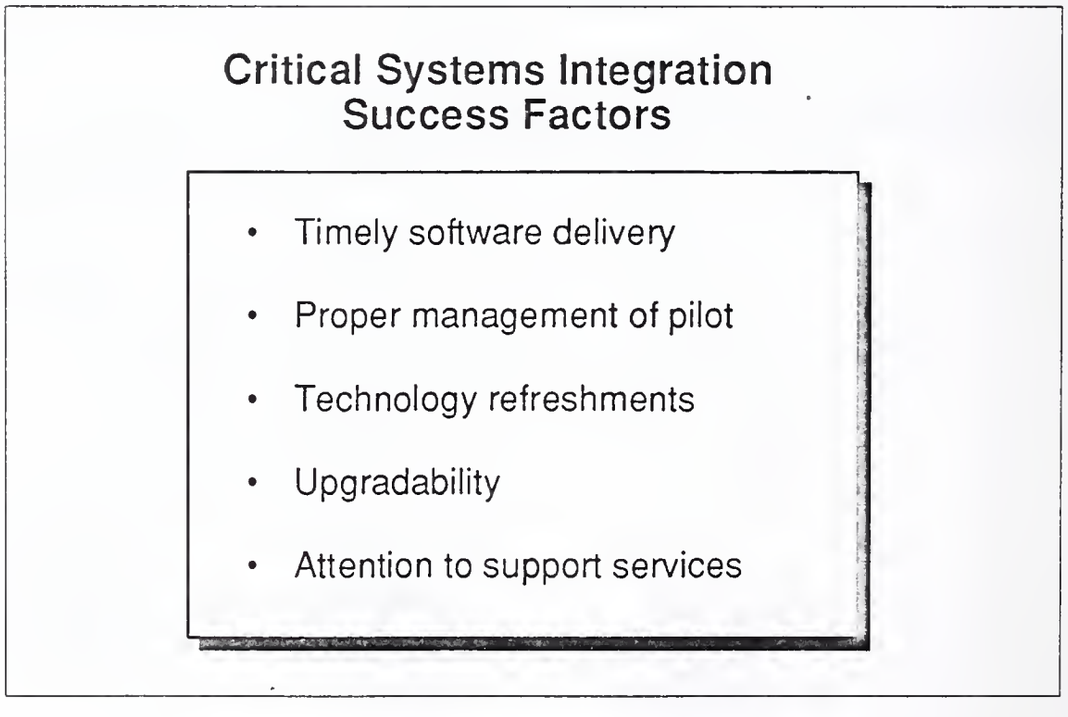
F

Critical Success Factors

Although the federal SI market is considered mature, it still has not reached its full potential. More successes must become widely visible to enhance the credibility of contractual federal SI prospects.

Based on interviews and case studies, INPUT has identified elements which are critical to a successful SI effort. These are listed in Exhibit II-6.

EXHIBIT II-6



Virtually every major SI effort involves tailored software development. Although some may result from modifying existing software, most comes from new software developed to solve a specific client problem. It is usually late. This causes the integrator to lose his or her credibility, costs the government and the integrator money, and, if very late, may even kill the project. Thus, timely software delivery is critical to the success of the SI effort.

Although software products are becoming more important to federal SI programs, these too may cause problems, especially if the software must be modified. However, both vendors and agencies usually find less risk with packaged software than with custom software development.

If a pilot of the system is involved, special management attention is required. This is especially true when the integration effort involves office systems that change the way people work. Without proper user communications, the pilot will probably fail, which may in turn result in cancellation of the entire program.

Given the rapidly changing base of hardware and software technology, any large system is likely to be at least partially obsolete by the time it is completely installed. Accordingly, the integrator must plan for technology refreshments throughout the contract in order to maintain system efficiency and effectiveness. The need for upgrading installed systems relates to technology refreshments. Technical solutions must be sufficiently open-ended to accommodate growing agency requirements.

Finally, to ensure success, the systems integrator must pay careful attention to support services. No matter how elegant the technical solution, the poorly supported project may still fail. If not properly maintained (in terms of both hardware and software), the system will either fall into disuse, or at least be used improperly. Further, without adequate training and consulting support, the system will never realize its initial goals. It may still work and provide some benefits, but it won't achieve its full potential.

G

Recommendations

Successful integrators must realize the critical success factors listed in Exhibit II-6. In addition, INPUT recommends some additional steps, listed in Exhibit II-7.

- Successful integrators must thoroughly understand the federal procurement process. Vendors need to know how the system works to minimize the risks inherent in virtually every major procurement.

- A key element of all federal SI projects is sound project management. To be successful, the integrator must deliver a comprehensive functioning system on time and within budget.

EXHIBIT II-7

Recommendations

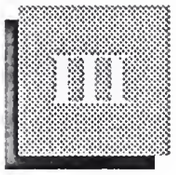
- Process understanding
- Project management talent
- Proper teaming selection and management
- Proper focus of marketing efforts
- Empathy with customer problems

- Most, if not all, SI projects are so complex that a single vendor cannot expect to satisfy the user requirements alone. Proper teaming selection for the proposal effort and a proper teaming relationship during project implementation will lead to more wins and smoother efforts.

- Bidding too many opportunities can rapidly exhaust a company's bid and proposal budget and burn out the staff. To win frequently, the successful integrator needs to focus marketing efforts with proper prepositioning. Knowing when not to bid an opportunity is almost as critical as knowing when to bid.

- Finally, the successful integrator must empathize, not just sympathize, with the customer's problems. The vendor needs to understand the issues with which the customer (or prospect) is coping. The pre-proposal, proposal, and postaward activities must reflect a solution to the problems.

In view of the continuing prospects in this marketplace and the growing roster of participants, proactive vendors will need to adopt all of these strategies, and more, in order to succeed.



Market Analysis and Forecast

A Overview

Over the past year the federal systems integration market has become more active, competitive, and controversial. In terms of activity, many additional agencies now have begun to define their requirements in SI terms. In terms of competition, practically all major federal vendors now claim past or present SI experience, or future capability. In terms of controversy, an issue is now being discussed that goes to the heart of the SI concept.

GSA (principally Frank McDonough) argues that the larger a project becomes, the more obstacles it encounters. These obstacles include the following:

- Funding reduction
- Heightened vendor protest activity
- Extended schedules
- Increased turnover rates
- Greater oversight or congressional review

No matter how good a job the government agency does, any one of these obstacles may derail the effort. GSA argues for a more modular approach, to take advantage of little successes and manage better the obstacles. Visibility alone can damage many projects.

The problem occurs when projects do not lend themselves to a modular approach, at least in terms of design. Two obvious examples are Treasury's Tax Systems Modernization and Navy's Stock Point ADP Redesign (SPAR) program. In many cases, agencies will probably compromise with a top-down grand design and a bottom-up, modular implementation. However, this approach can dampen the systems integration growth rate, especially if more agencies buy information system

capabilities a piece at a time. DLA's new approach on the Logistics Systems Modernization Program (LSMP) is a case in point. INPUT's forecast takes this potential trend into account. However, various countervailing forces will still foster significant growth in the federal SI market.

Agency executives need trend analyses and status reports that accurately portray funding, staffing, and performance progress against mission objectives. They require accurate, up-to-date information management which integrates various diverse activities into a coordinated whole.

Key government agencies—OMB, GSA, GAO, and NIST—have initiated a progression of acquisition reforms to accelerate the acquisition rate and improve the management of information resources (ADP and telecommunications) while fostering wider competition. The recent adoption of GOSIP and POSIX as FIPS will promote the acquisition of OSI-compliant products that foster interoperability, connectivity, and upgradability of federal systems.

B

Market Forecast

The federal systems integration market will grow from $2.7 billion in GFY 1989 to $6 billion in GFY 1994, at a CAGR of 18% (Exhibit III-1). Although the overall market growth rate is consistent with that projected last year, the growth rate of mode forecasts, as explained below, differs somewhat from last year's forecast. In particular, the equipment portion of SI has been flat over the past year, reflecting sizable budget cuts at many agencies, especially on the Defense side.

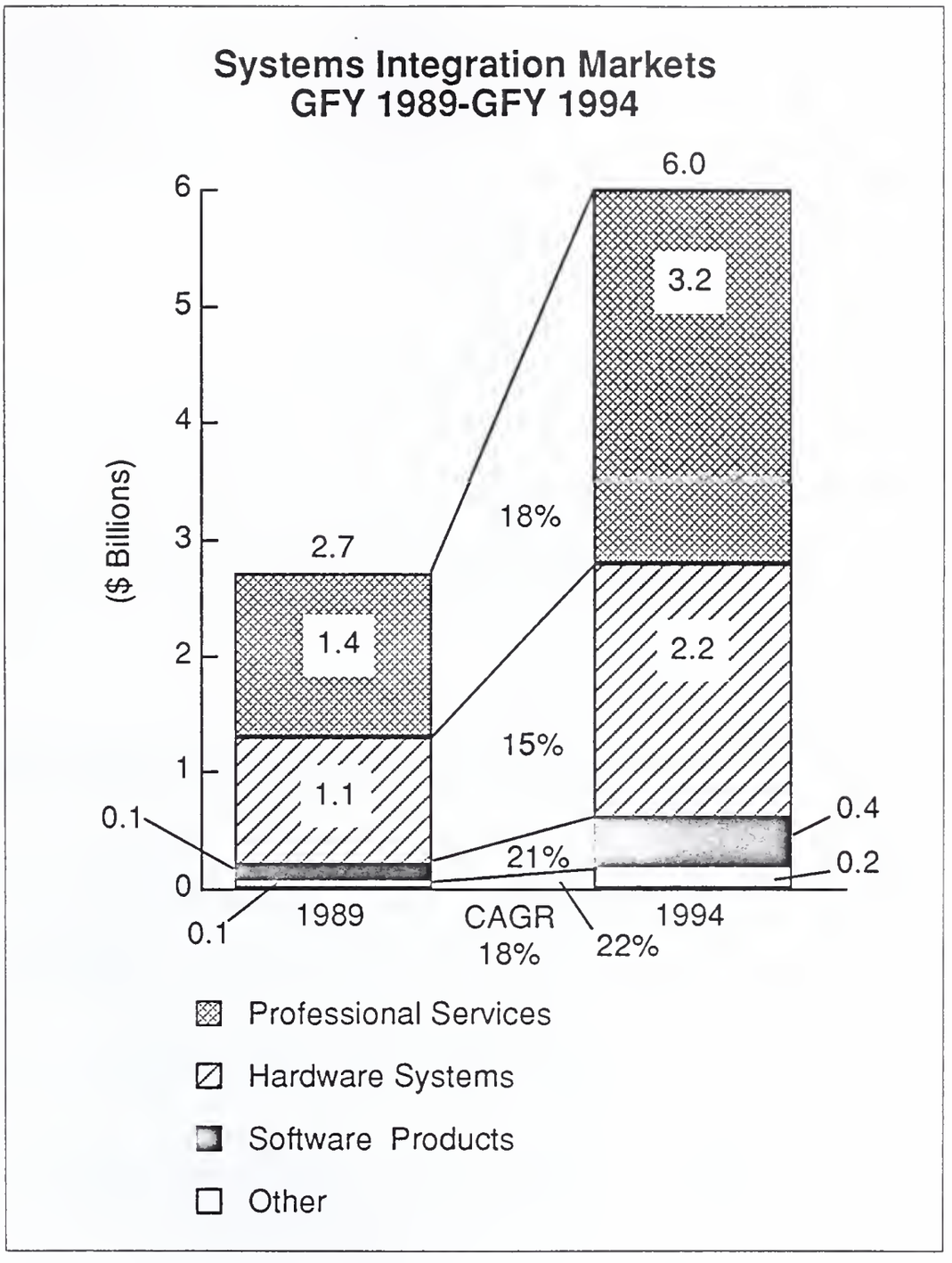
Although the growth rate of hardware stayed about the same, the actual spending declined by $100 million from GFY 1988 to GFY 1989. This change came about in part as a result of the Defense freeze on R&D spending in the second half of GFY 1988. Professional services, on the other hand, rose slightly faster than expected, reflecting the growing need for expert technical support.

1. Delivery Mode Forecast

INPUT currently divides systems integration into four subdelivery modes:

- Professional services
- Custom software
- Packaged software
- Equipment

EXHIBIT III-1



This approach permits a more comprehensive comparison between the modes and with the commercial market. As illustrated in Exhibit III-1, the various modes will grow at differing rates. This reflects the expected shift of emphasis from hardware to software and services in systems integration projects over the next five years.

The professional services portion of the systems integration market is expected to grow from $1.4 billion in GFY 1989 to $3.2 billion in GFY 1994, at an CAGR of 18% This includes only that portion of the federal professional services market devoted to systems integration. The SI-related professional services include the following categories:

- Program management
- Consulting
- Design
- Integration
- Education and training
- Documentation
- Systems operations (facilities management of client-owned systems)

In general, the federal professional services market continues to grow, but the systems integration portion is expected to grow faster. Further, INPUT has noted a growing trend to include systems operations as a part of systems integration contracts. The growing shortage of federal technical professionals is fueling the need for additional contractor consulting support.

Many agency information technology (IT) budgets for GFY 1990-GFY 1991 have increased dramatically in the operations and maintenance line of the OMB Circular A-11 section 43A exhibit.

Growth in software products is largely determined by OMB pressure, software certification trends, and packaged software availability, all of which are expected to increase. In response to growing demands for functionality by agency customers, INPUT expects more packaged software to be installed per system. The increasing availability of custom software tools (sometimes referred to as analysts' workbench and programmers' workbench) will drive the growth in software products.

Software products consists of standard software packages, with little or no modification, which can be used effectively in a variety of situations. Software products are also more cost-effective because of dramatically lower unit costs when compared to custom software development.

The software products portion of the systems integration market should grow from $140 million in FY 1989 to $350 million in FY 1994, at an CAGR of 21%. The factors cited above account for most of the growth in this segment. In particular, the availability of packages to meet agency needs will support this growth.

After professional services, computer and communications equipment account for the next largest share of the federal systems integration

market. However, its 15% CAGR will lag behind all the other components, and is comparable in part to the lower overall growth rate (5%) of the general federal equipment market, as reported in several other INPUT federal market reports. The growth rate also illustrates the declining unit costs of equipment, as expressed in price per throughput or capacity to do work. Finally, as previously discussed, the lower rate indicates agency intentions to realize greater functionality from their equipment investment, largely by putting more software on each hardware system.

The "other" service mode includes outlays for site preparation, installation, test equipment and tools, processing services and networks for tests and simulations, and test and acceptance activities. This subdelivery mode of the federal SI market will grow from $100 million in GFY 1989 to $250 million in GFY 1994, at a CAGR of 22%. This high growth rate reflects the increased spending for the types of support services. The government is using both profit and not-for-profit contractors to assist in the test and acceptance process.

2. Agency Forecast

Currently, civilian SI spending exceeds that of Defense by almost half a billion dollars, as shown in Exhibits III-2 and III-3. This reflects current budget constraints in the Defense Department. However, INPUT does not expect these constraints to continue throughout the forecast period. Most major SI initiatives are not being cancelled, although some may be deferred or stretched out. As a result, the Defense market will grow slightly faster than the civilian market over the next five years, although it will be starting from a smaller base.

The agency integration activity forecasts are based on a combination of long-range ADP plans, projection of previous Information Technology Budgets, programs described in the agency OMB A-11 Section 43 A & B budget requests, and interviews with policy officials and ADP center managers. Only those programs specifically identified by agencies in their planning documents and funding request submissions are included. Generally, this includes programs with a life cycle cost greater than $1 million. The number of identified integration programs for custom systems integration is shown in Exhibit III-4 (individual programs are identified in Chapter VI).

Not all SI efforts involve major expenditures. In fact, some efforts can be quite modest, providing small vendors with the experience needed to take on larger tasks. However, the number cited in Exhibit III-4 refer mainly to the larger projects.

EXHIBIT III-2

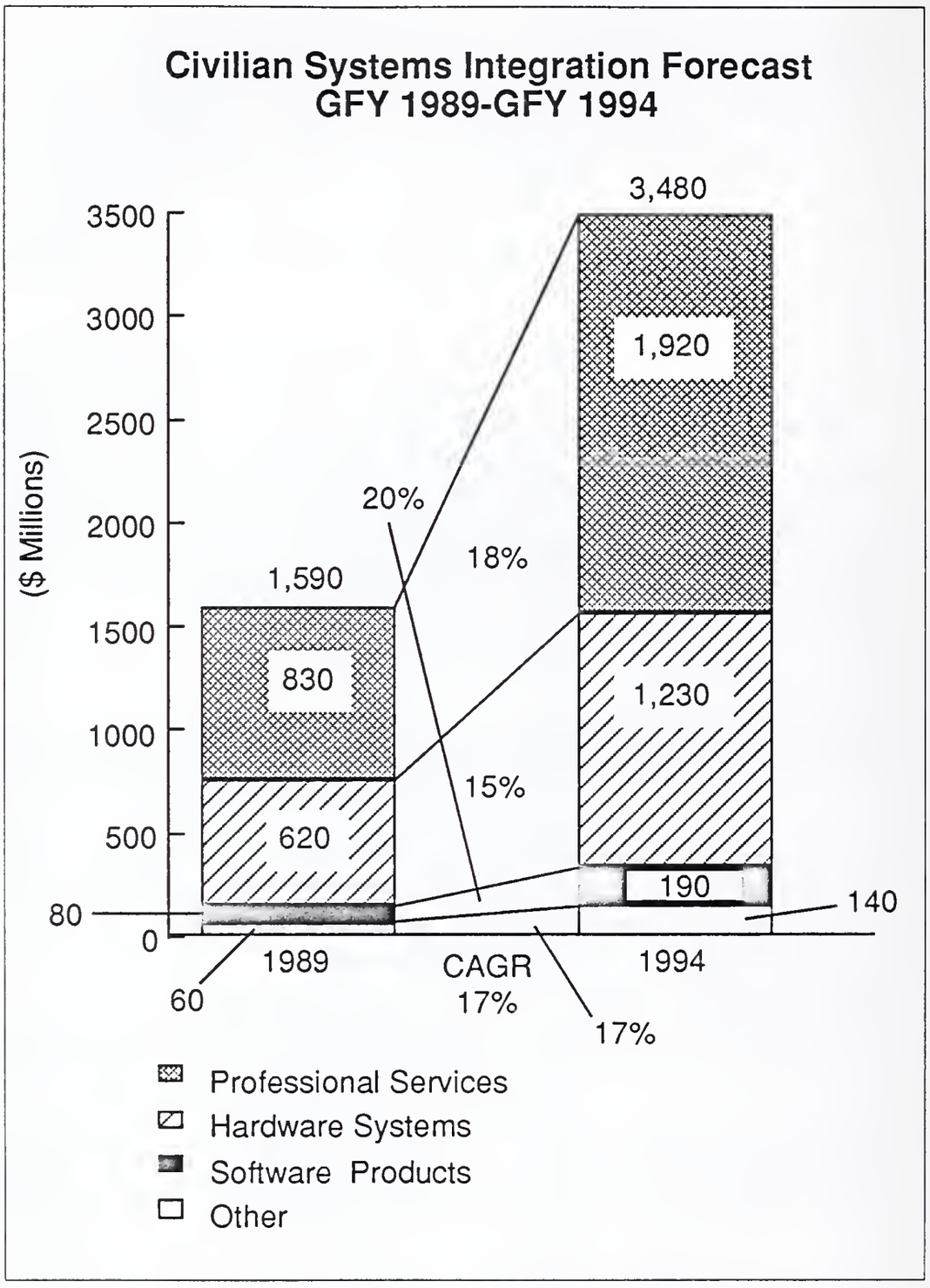


EXHIBIT III-3

Defense Systems Integration Forecast GFY 1989-GFY 1994

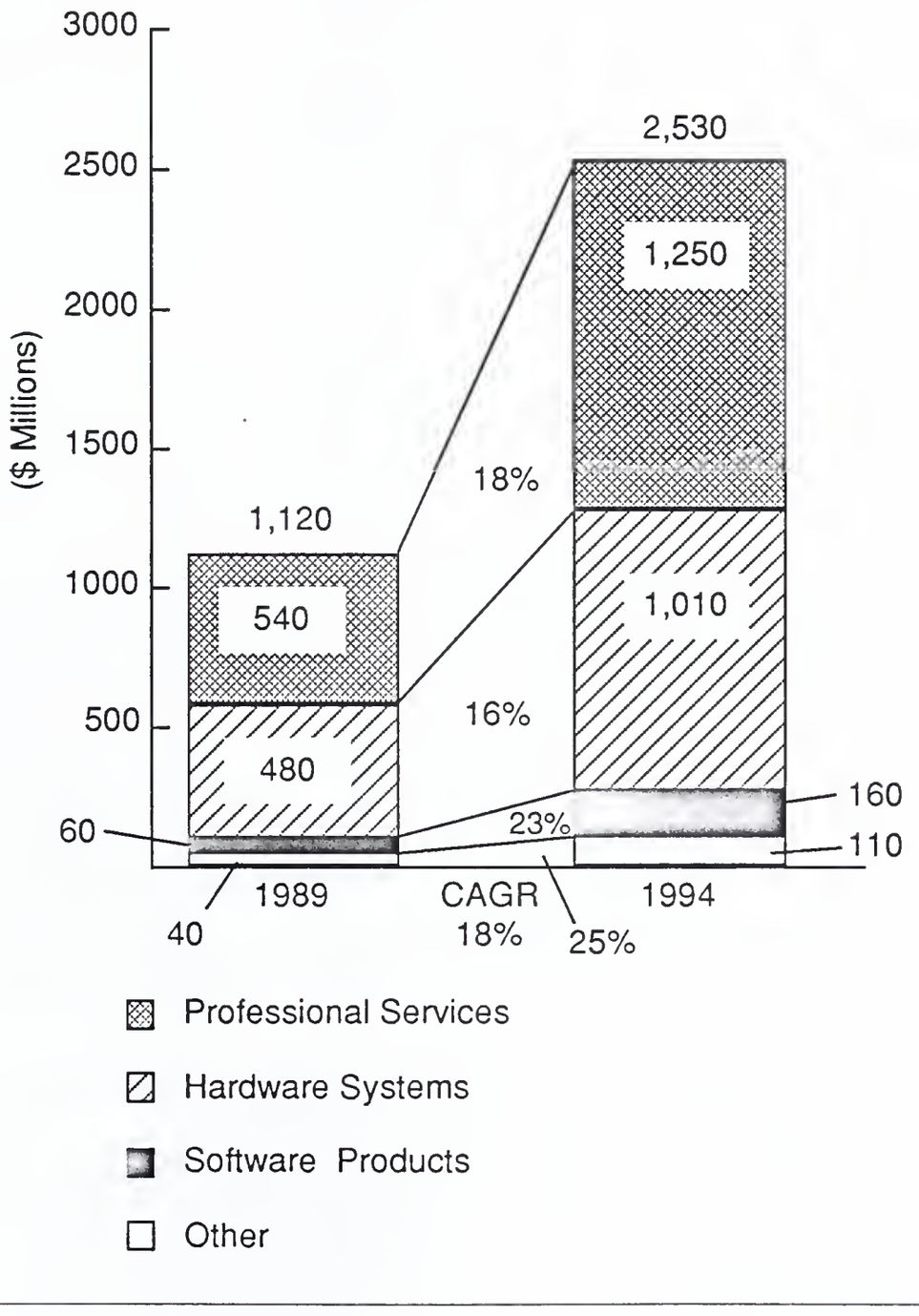


EXHIBIT III-4

Custom SI Initiatives by Agency FY 1989-GFY 1994

Agency	Number	Funding ($ Millions)
Defense		
Air Force	7	428.3
Army	4	233.5
Navy	5	92.1
USMC	1	4.9
DLA	2	49.9
Subtotal	19	808.7
Civil		
Agriculture	1	112.5
Commerce	2	131.4
GSA	1	unk.
HHS	5	632.3
Interior	3	371.6
Justice	1	28.5
NASA	2	119.3
State	1	88.1
DoT	3	350.8
Treasury	7	1518.7
VA	1	48.0
Subtotal	27	3401.2
Total	46	4209.9

Source: OMB Circular A-11, Federal budgets, Sections 43A-B, GFY 1989-1994

Estimates are unavailable for the cost or funding of planned conversion of applications from other information processing resources to new, in-house systems. The current resources include remote computing services, systems operations, and government data centers outside the agency. The level of monthly costs for running the application are not provided.

The representative agency SI program budgets are a combination of part of their ADP systems upgrade and replacement budgets and most of their new systems acquisition budgets. This list excludes recently awarded programs, such as Army CALS, and programs currently in source selection. The overall forecast does anticipate the approval and funding of these programs. Most acquisitions are assigned to expansion or upgrade of current systems.

The proportion of agency programs designated as upgrades, replacements, and new systems is discussed further in Chapter IV.

3. Applications Forecast

In an earlier INPUT survey, defense and civil agencies identified information resource applications by a wide variety of titles. Each of the military departments and defense agencies provided different codes and/or acronyms for such common commercial applications as personnel, payroll, distribution, and accounting.

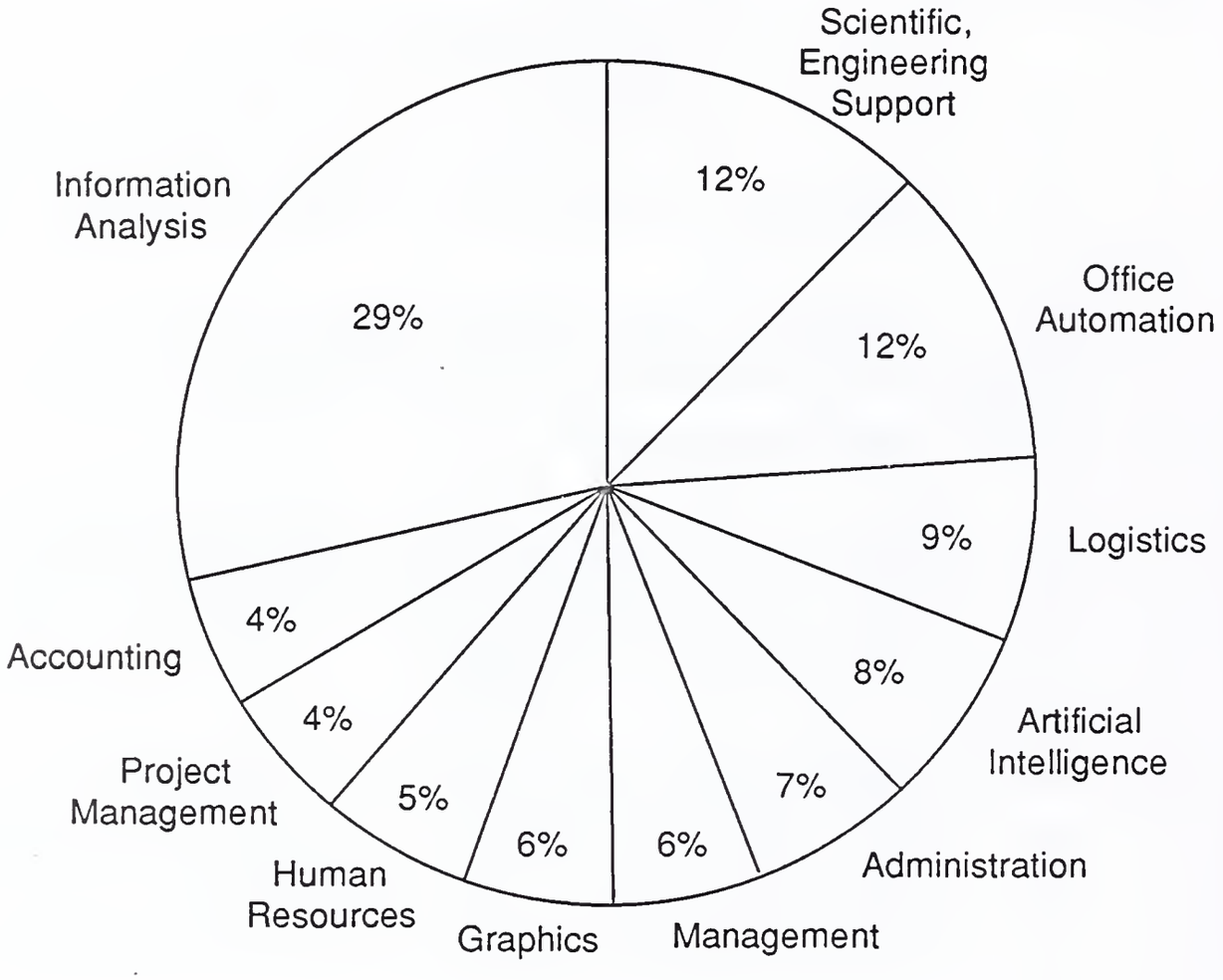
Applications have been converted to INPUT's terms as defined in Appendix B, with variations on applications for particular functions grouped with the basic application. This facilitates analysis of the data. The approximate distribution of primary and secondary applications for systems integration initiatives as identified by agencies is shown in Exhibit III-5. More specific information on current SI opportunities is provided in Chapter VI.

The applications forecast is not intended to be an accurate prediction, but merely representative of what vendors can expect in the federal SI marketplace. A number of SI programs note that additional applications will be added later in the program by either contract or in-house staff without specifying the application. INPUT expects more mission-oriented applications in the near future, as staffing constraints force agencies to contract out more mission support. SI replacement programs do not specify all of the resident applications that will be converted to the new machine. The implied trend of the identified operating systems and applications is discussed in greater detail in Chapter IV.

Exhibit III-5 shows that in the INPUT SI applications survey, artificial intelligence achieved a measurable and significant (8%) rating from the survey sample. INPUT also expects this to grow. However, applications

EXHIBIT III-5

Federal Systems Integration Market by Type of Application



Primary and secondary applications categorized.

Note: Figures do not add up to 100% due to rounding.

Source: INPUT survey

planned for conversion from nonagency processing centers—RCS, COCO (FM), government data centers, etc.—were not adequately defined by type and number in the representative interviews. Also noted was the tendency for timesharing systems to continue to take a smaller portion of most applications.

C

Competition

Competitors vary in size, growth, and rates with the projected value of the SI project, applications, sponsoring agency, and end user of the system. Brief profiles of the top ten federal SI vendors are provided in Chapter V.

Potential competitors for each category of systems acquisition are identified by service category. Some vendors compete in several categories because they offer products and/or services over a number of commercial and government sectors, including the following:

- Specialized, integrated systems
- Midsize/microcomputer-based systems
- Midsize/microcomputer network-distributed data systems
- Large CPU-based systems with or without distribution networks
- Supercomputer systems that are frequently the host of several mainframes that may support distributed midsize computer and microcomputer terminals

1. Top Ten Systems Integrators

The INPUT list of the top ten SI vendors in FY 1989 is based on announced contract awards, interviews of earlier INPUT Procurement Analysis Reports of SI activities, and cumulative reports from CBD notices and other sources on contracting activity.

Published on the basis of this data, INPUT lists the top ten federal SI vendors in the order of reported expenditures, in Exhibit III-6.

Brief profiles of each of these firms can be found in Section V of this report. Many of these same firms are also leaders in the commercial systems integration market. IBM, EDS, Unisys, and Control Data Corporation are included in the top ten list for commercial systems integration.

Many up-and-coming systems integration firms did not make this list. Although many have higher growth rates than the veteran systems integrators, the level amount of their revenues from systems integration is not as great.

EXHIBIT III-6

Leading Federal Systems Integrators, FY 1989

1. IBM
2. Electronic Data Systems (EDS)
3. Computer Sciences Corporation (CSC)
4. Science Applications International Corporation (SAIC)
5. Grumman Data Systems (GDS)
6. Unisys
7. Boeing Computer Services (BCS)
8. Planning Research Corporation (PRC)
9. Martin Marietta Data Systems
10. Control Data Corporation (CDC)

Note: Ranked in order of reported revenue for GFY 1989.

2. Professional Service Vendors

The larger professional service vendors are usually both prime contractors or system engineers/integrators in the federal SI market. Other professional service companies have smaller, more limited offerings to the federal SI market, or are involved through separate contracts with the contracting agency. These include accounting firms and management service firms.

The field of accounting firms and management service firms in the SI market has been narrowed due to an unprecedented number of mergers among these firms. Deloitte, Haskins and Sells merged with Touche Ross to form Deloitte and Touche. Ernst and Whinney merged with Arthur Young to create Ernst and Young. Other firms in this field include Arthur Andersen (Andersen Consulting), Coopers and Lybrand, KPMG Peat Marwick, Booz-Allen & Hamilton, American Management Systems, and Bolt, Beranek, and Newman. These firms specialize in financial, budget, accounting, and management services applications.

3. Equipment Vendors

The major midsize- and large-CPU vendors are also contenders for contracts for SI programs because most offer upward-compatible CPUs for systems being replaced and newer systems with enhanced capabilities. These vendors include Amdahl, AT&T, CDC, Cray, DG, DEC, Gould, Harris, HP, Honeywell, IBM, NAS, NCR, NEC America, Prime, Rolm, Stratus, Tandem, Tektronix, Unisys, Vion, Wang, and Zenith.

4. Foreign Competition

The prospect of hardware systems competition from the Far East and Western Europe for nonsensitive administration, management, and office automation projects is not expected to become a major factor until trade relations improve. The popularity of the "Made in America" campaign, coupled with the government's desire to remove trade barriers to reduce the trade imbalance, places restrictions on the amount or type of business foreign competitors can currently secure. One solution for foreign firms has been to buy American firms in order to break into the business. Two examples of this are Hitachi's 80% ownership of National Advanced Systems, and Groupe Honeywell Bull's recent purchase of Zenith Federal Systems.

D

Integration Opportunities

Chapter VI contains a list of major SI opportunities. Programs awarded earlier have been listed because they have multiple phases with some contracts yet to be awarded. Most federal SI contracts always have some prospect of being recompeted. A few smaller SI programs have been defaulted and may be recompeted. The federal market is currently very volatile, at least on a program-by-program basis.

The programs listed for FY 1989 include a number at the solicitation and proposal stages for which awards have not yet been made. Some programs listed for FY 1990 already have feasibility, preliminary design, and requirements analyses underway, but the prime contracts or SE&I contracts have not been awarded. The program lists for GFY 1990-GFY 1994 are smaller because a number of candidate programs for those years have not yet been approved by the sponsoring agency.

E

Federal Market Issues

During the two most recent administrations, presidential task forces investigated the problems and technological status of the federal government's information processing resources. Findings are shown in Exhibit III-7.

EXHIBIT III-7

Federal Information Processing Weaknesses

- Slow to adopt new technology
- Obsolete ADP inventory
- Ineffective management of ADP resources
- Inadequately trained personnel
- Insufficient information processing for public needs

The investigations showed significant shortcomings:

- The government has not taken full advantage of the technological advances of the private sector.
- A substantial amount of the ADP inventory was already obsolete or rapidly becoming so.
- Federal executives have not managed ADP resources effectively.
- Federal personnel were not adequately trained in the use of information technology.
- Major initiatives were urgently needed to bring federal information management to the level needed for regulation, taxes, security, and services to the public.

These findings, along with some fundamental changes in GSA's information systems (IS) management policies, led to gradual changes in IS procurements. These changes have support of the need for integrated solutions.

Systems integration procurements are both fueled and delayed by budget constraints. The constraints tend to enhance prospects for vendor services, as opposed to the government providing services through in-house resources. Agencies' requirements for large integrated systems may also be changed if GSA revises its rules on granting DPAs (Delegation of Procurement Authority) to force adherence to a more modular approach.

Deficit control measures, such as the Gramm-Rudman-Hollings (GRH) Act, are forcing agencies to cancel programs that do not satisfy tight

productivity improvement requirements. Other programs that do not meet urgent or emergency mission requirements are delayed or stretched out over time. At this writing, more than $16 billion in FY 1990 spending has been sequestered.

Systems acquisitions in the second half of the 1980s addressed needed improvements in management, administration, human resources, and logistics functions that had not been moved to newer data processing resources in more than a decade. These have been manifested in the focus of systems integration procurements.

1. Federal Policies and Regulations

Both agencies and vendors face difficulties in complying with the sheer number of federal policies and regulations while trying to fulfill information processing requirements.

GSA intended that the FIRMR would streamline the information resources acquisition process. GSA has just completed a rewrite of the FIRMRs to reflect significant legal and regulatory changes, and to expedite procurements. With different versions of a Paperwork Reduction Reauthorization Act pending in Congress, however, the FIRMRs will probably require further rewrites.

Other regulations and policy initiatives changing the acquisition procedures include the following:

- The Competition in Contracting Act (CICA) of 1985 provided expanded legal powers for ADP protest action via the GSA Board of Contract Appeals (GSBCA) and GAO, increased the opportunity to employ negotiated contracts, and established seven more restrictive categories of exceptions that permit sole-source awards. Agencies view the CICA as allowing vendors to complicate and lengthen the acquisition process. The act's provisions make it easier for vendors to protest procurement activities and bring temporary halts to procurement schedules. Virtually every major procurement has been protested, citing violations of the CICA.

At this writing, the Paperwork Reduction Reauthorization Act of 1986 has expired, without replacement legislation being passed. The Paperwork Reduction Reauthorization Act expanded the power of the GSBCA, but also retained the Warner Amendment, which provides DoD with mission-critical ADP procurement exemptions to Brooks Act coverage, except for application of general-purpose ADPE in noncritical functions, such as testing, recalibration, and programmer workbenches.

Several other issues have arisen that are now being studied. These include software rights, data rights, and second-sourcing of some systems. INPUT expects these issues to continue to create problems on some hardware procurements, including systems integration.

As is well-known in the vendor community, the CICA has not achieved the expected improvement of competitive opportunities, while providing more equitable resolution of protests. The results have been anything but equitable. Most successful protests result from one or more of the following defects:

- Failure to follow stated evaluation plans
- Procurement process inconsistencies
- Improper documentation
- Defective pricing
- Inconsistent information dissemination

GSA's limited procurement review of the past few years has eliminated much of the expert examination of procurement actions. Many vendors now believe that more review is needed. Some have even indicated that, in certain circumstances, losing can be more profitable than winning.

Another law which is already having negative effects on federal procurements is the Procurement Integrity Act. The act, which went into effect on July 16, 1989, was written to ensure that no bias infringes upon the procurement process. It requires procurement officials to certify that they have complied with the law and that all members of their contracting teams have complied with its provisions. The law carries penalties for both government contracting officials and vendors, including fines and imprisonment.

The Procurement Integrity Act has galvanized contracting officials into inaction. Most of the contracting officials in the government do not fully understand the law, and they fear the penalties associated with violating it. Thus the contracting officials will do nothing that they think might be illegal.

2. Budgetary Constraints

Future-year funding of current acquisition programs and approval of funding for the next budget year are always in doubt in the federal government market. The authorization of an agency budget and the requested information sources by the agency oversight committee do not assure the agency or vendors that funds will be provided in the out years. Appropriation Acts for the agencies approve the TOA (Total Obligational Authority) for certain large systems, but not the fiscal year or years in which the funds (called outlays) will be available.

Continuing economic and political sensitivity to the large national budget deficit could negatively affect a number of acquisitions in the less-than-critical defense and civil technology sectors. The current budget sequestration for FY 1990, should it stay in effect, will probably affect these areas. Major ADP systems already approved are probably to continue in preference to unapproved programs. Furthermore, ongoing production, through operational support contracts, must continue.

INPUT expects budget difficulties to continue to constrain the federal information systems market, particularly on the Defense side. If the procurement process is simplified to reduce the protest volume, however, acquisitions should begin to increase. Many view information systems as key to productivity increases. Budget constraints therefore sometimes lead to increased opportunities in the information systems market.

3. Software Integration and Productivity Improvements

Software is the interface medium between machines, applications, and end users. Agencies need strategies and vendor support to implement these integrations. Agency respondents in previous studies noted a growing need for portable software that is readily adaptable to a changing hardware environment. As new hardware technologies are put in place, the next generation of software must accommodate change and communications between incompatible equipment.

Similarly, agencies are increasingly required to merge large applications into a single, transparent software system that fits their end users' needs, rather than the government end users adapting their needs to the capabilities of the software.

To modernize software and effect productivity improvement, agency ADP organizations are seeking greater use of the following:

- Software engineering technologies, including more efficient software management methods, software development methodologies, and data dictionaries

- Higher level development tools, including program generators and fourth-generation languages

- Better analytic tools for all sizes of machines—microcomputers, midsize computers, and mainframes—that will give programmers development aids such as automatic documentation, cross-referencing, etc. Many SI programs include requirements for these technologies.

One approach—data administration—provides techniques and software tools to arrange large amounts of data. By organizing, indexing, and

cross-referencing data according to the business requirements of the organization, agencies are better equipped to plan the comprehensive development of future systems. Specifications from the American National Standards Institute (ANSI) are now being reviewed by agencies and vendors. Although a standard data dictionary software specification is some years away, vendors, especially of data base management systems (DBMS), need to be aware of the pending impact of this trend.

Agencies are using fourth-generation languages (4GLs) to increase productivity in software development and maintenance. Currently, 4GLs are used primarily for end-user computing and reports, along with some decision support. Other applications for 4GLs are being designed and will eventually ease the burden on agency staff; government computer resources experts are concerned with the demand on computing capability of 4GLs and will look for 5GLs with improved efficiencies. Many information systems procurements include requirements for 4GL experience. Advanced hardware designs, including Reduced Instruction Set Computing (RISC), will make (traditional) inefficient 4GLs more feasible. Hardware inefficiency will matter less than it used to.

4. Artificial Intelligence

Artificial intelligence is a market segment in which vendors focus on the introduction of new technology to the government, primarily in the areas of software development efforts and decision support. Currently, agencies are developing expert systems (which are a popular subset of the family of AI capabilities) as standalone, end-user production systems to automate knowledge-based processing. In meeting federal systems integration needs, vendors must often include AI features as part of their offerings.

The DoD is taking the lead in developing artificial intelligence programs. AI provides useful training for analysts, and applications are being employed in tactical situations and support functions. Civil agencies are also developing and operating expert systems for large-scale information processing. In a previous report, INPUT reported that decision support systems represent the most common government application of AI. However, AI is also being used in the development of microcomputer security products.

Industry views the current AI opportunities to be in product-oriented services for prototyping systems for the federal agencies. As in other software areas, the government is looking to industry for solutions, not just products. In response to this trend, therefore, AI vendors are expected to migrate beyond standalone systems to new products that integrate approaches and solutions, and aid in developing closer links to the main flow of an agency's information processing.

Many small AI vendors focus their marketing efforts on IS directors, and are providing products to facilitate information storage and retrieval, data communication, and other typical management functions. Current federal prototyping efforts demonstrate AI feasibility in those IS functions, as well as in other decision support areas. Areas in which federal workers must interview the public seem especially promising for AI. In a previous report, INPUT found that many federal AI applications were being applied to specialized, midsize computer systems.

5. Uncertainties and Issues

Federal agencies, in their attempts to consolidate disparate ADP systems, are bundling their requirements for information systems into massive contracts. These large projects cause big problems: they are time-consuming, costly, and the potential users overestimate the systems' ability. Another problem with large-scale projects is the lack of agency staff and managers with the necessary experience, skills, and management power.

Over the past year there has been rethinking within the government on the issue of "grand design" systems integration projects. In 1988, GSA wrote a report entitled *An Evaluation of the "Grand-Design" Approach to Developing Computer-Based Applications Systems*. The report outlined ten issue areas with the most effect on grand designs (see Exhibit III-8). The report cites several criticisms of the grand-design approach to procurements, including a modular, incremental approach to the project. A more detailed version of the report is due out in December 1989. The sequel to the Grand Design report will describe specific alternatives to large-scale SI programs.

However, many of the criticisms of the grand-design report can also be applied to the modular approach. Planning, personnel training over time, coordination problems, funding, and interoperability are required for either approach to be successful. Grand-design and modular projects must in the end be tied together into integrated systems. The real difference between the two approaches appears to be the contract vehicle.

Some systems integration vendors favor a modular approach, beliving it is the only logical way to develop a major system. They would like to make a fundamental change in the way the government buys its systems: they think procurements should be competed on a functional basis rather than on detailed specifications. The contract would then be awarded based on the efficiency of the vendor's concept. This concept is similar to the way commercial systems integration projects are done. The vendors would also rather develop these systems under something other than a fixed-price type contract.

EXHIBIT III-8

Ten Issue Areas that Have the Most Effect on Grand Designs

1. Coordination problems within the agency during the planning phase
2. Procurement problems during the procurement phase
3. Lack of acquisition skills during the planning and procurement phases
4. Placing the program high enough in the organization in the planning phase
5. Uncertain funding during the planning phase
6. Audits by GAO during planning and procurement phases
7. Problems with contractors during procurement
8. Staffing problems during planning, procurement, and operations
9. Problems with procurement regulations during the procurement phase
10. Unrealistic time schedules during the planning phase

Source: Table 2, Draft Report, *An Evaluation of the 'Grand-Design' Approach to Developing Computer-Based Applications Systems,* GSA, Information Resources Management Service, July 1988

A variety of agencies are participating in GSA's "Go for 12" program, with varying results. Each agency will work with GSA in one of three pilot projects designed to model and test different aspects of the acquisition process. The three parts of the program are the elimination of unnecessary bottlenecks in the acquisition process, the potential for parallel review of acquisitions, and the provision for special training in ADP and telecommunications acquisitions. The results and recommendations will be used to develop new procedures throughout the government. Up until now, however, very few federal initiatives have achieved the schedule objectives.

Probably the most vital solution to these issues is communication between the vendors and government. However, communication is impaired by protests under the Competition in Contracting Act and by the Procurement Integrity Act, both of which make the full functioning of the procurement process impossible.

Since part of the problem with large SI projects is federal managers' lack of expertise, GSA has initiated the Trail Boss program. Under this program, senior IRM officials at civilian agencies are responsible for overseeing the contracting process of major acquisitions from beginning to end. The designates are given specialized training courses and aided by upper agency management to see a project through successfully. But vendors complain that the courses teach too little and have too few Trail Boss trainees. Some agencies oppose the program partially because of its focus on the individual rather than the agency.

Agency Requirements

A Overview

The opportunities in the federal SI market appear in a number of agencies. Exhibit IV-1 presents the distribution of integration initiatives identified by agency and type of effort.

Expansion programs represent 45% of the SI market. Most are planned by the three major defense agencies: Air Force, Army, and Navy.

Replacement programs comprise 15% of the market from FY 1989 to FY 1994, representing a small increase over the 1988 version of this report.

The number of new SI programs is slightly fewer than in the 1988 version of this report, representing 40% of the federal market. INPUT has identified nearly the same total number of systems integration efforts in this update of the report. The number of programs identified is not all-inclusive, but represents agency trends for SI projects over the next five years.

Although the total number of identified SI projects has not changed from the 1988 version of this report, the number of projects within specific agencies has shifted as a result of the fulfillment and execution of some projects, and the development of new projects by other agencies. New starts have increased by 12% and replacement programs by 33% over INPUT's 1988 study. Upgrade programs have decreased by 19%. The small changes in percentages can be explained by the change in the stated goal of a project. During the development of an SI project, its definition and requirements can change before the RFP is released.

EXHIBIT IV-1

SI Opportunities by Agency and Type of Effort FY 1989-FY 1994

Agency	Upgrade/ Expansions	Replace-ments	New Starts	Totals
Defense				
Air Force	3	1	3	7
Army	2	0	2	4
Navy	3	1	1	5
USMC	0	0	1	1
DLA	2	0	0	2
DCA	0	0	1	1
Subtotal	10	2	8	20
Civil				
Energy	0	0	1	1
Agriculture	0	0	1	1
Commerce	1	1	0	2
GSA	0	1	0	1
HHS	1	1	0	1
Interior	2	0	1	3
Justice	0	1	0	1
State	0	1	0	1
DoT	2	0	1	3
Treasury	3	0	4	7
NASA	1	0	1	2
VA	1	0	0	1
Subtotal	11	5	9	24
Total	21	7	17	44

Source: Procurement Analysis Reports

B

Hardware Systems

ADP hardware requirements are only partially identified in systems integration programs. Under A-109 guidelines, hardware systems are functionally described but not specified until the selection of the final contractor. But few agencies even consider the conduct of A-109-type procurements. New system acquisitions below the A-109 thresholds do not usually specify particular brands. Rather, computer systems will be selected competitively after completion of system architecture design. Furthermore, in a number of defense administrative, accounting, and human resource applications, one vendor may supply computers to several systems with bulk purchase discounts under a requirements-type contract. Two examples of A-109 procurements are the Army Reserve Component Automation System (RCAS) and the National Weather Service Advanced Weather Information Processing System for the 1990s (AWIPS-90).

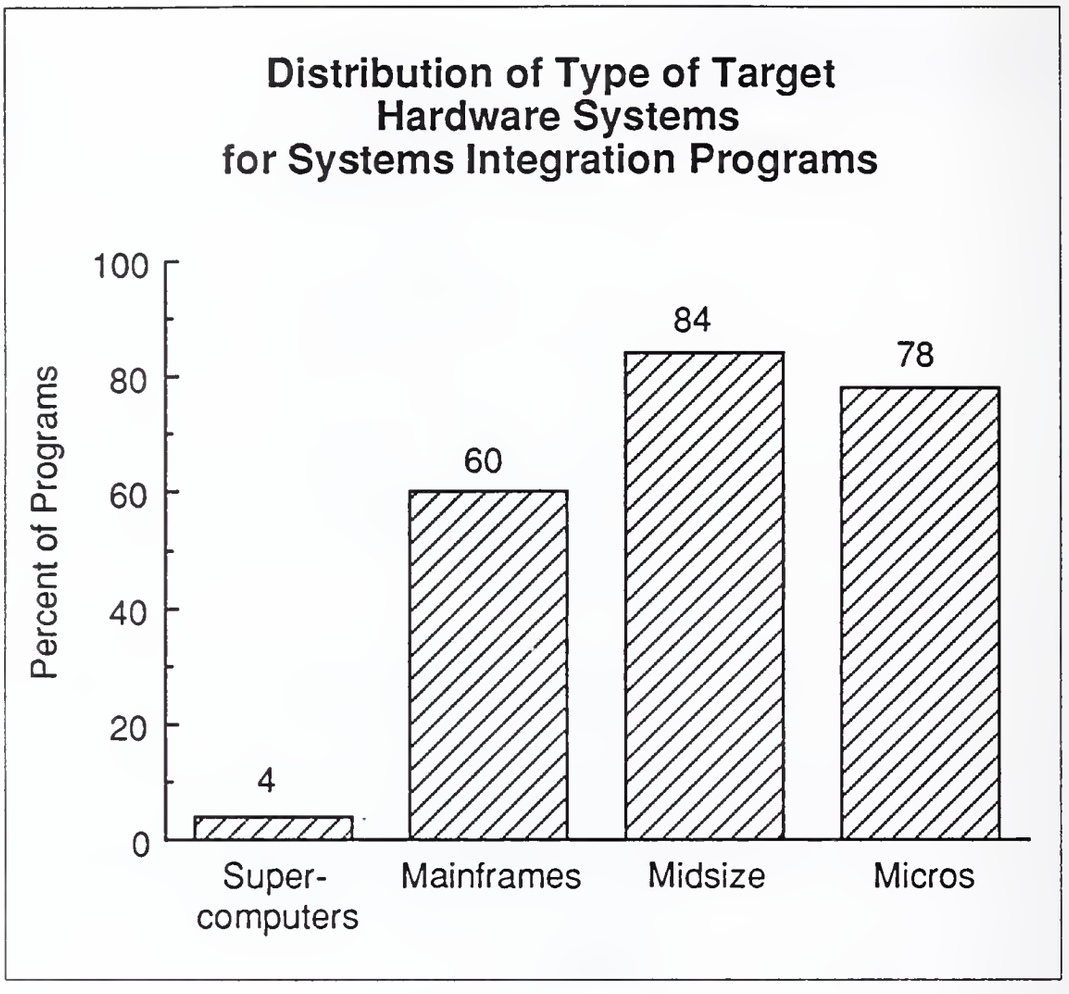
Exhibit IV-2 illustrates a continuing strong need for mainframe computers, although midsize computers and microcomputers represent about four-fifths of the actual hardware. Predictably, complex SI projects frequently use a combination of equipment types to solve a variety of user requirements. The number of microprocessors, consisting of PCs and specialized workstations, applies only to planned major systems. The number of microprocessors to be acquired for a range of smaller applications may be considerably higher, by as much as an order of magnitude.

The federal government had a total of 13,609 midsize systems installed as of the end of FY 1989. These computers were already, on average, over 12 years old. The government expects to continue to acquire many midsize computers to replace its aging systems. Midsize systems can serve in multiple roles and still be cost-effective. Some will serve clusters of microprocessors as network nodal processors, or as file servers for communications or front-end processors. They can also be used for scientific applications.

The government's large CPUs enjoy a higher profile and thus are replaced more frequently. The government's 626 large-scale systems had an average age of over 10 years, as of the end of fiscal year 1989. These large computers are used as DBMS and RDBS hosts and as intermediary processors for the supercomputers.

In the commercial SI market, companies with systems integration projects often have a low level of detail in their specifications. As a rule, functionality is less important than performance. By contrast, regulations restrict the federal government market to functional descriptions of its hardware requirements. The laws safeguard against monopoly of the federal market by any hardware vendor and allow systems integration

EXHIBIT IV-2



firms to propose more creative solutions. In the absence of a specification for a particular piece of hardware, the systems integrator in both federal and commercial markets can propose a system that provides the most effective solution.

Hardware manufacturers have become contractors in the commercial systems integration market where they can apply new technologies, expand markets for those technologies, and leverage existing and new product lines. In effect, they focus on using their typically limited professional services resources to maximize the return on their core business products. This is often true for federal market vendors as well. Most hardware firms prefer to apply their own core business products, and cannot avoid the use of other manufacturers' hardware. This policy may limit their ability to respond to all systems integration opportunities.

C

System Applications

The reference documents and the interviews for systems integration programs consulted in the previous versions of this report identified a wide variety of applications. Since this information indicates the current opportunities, they are included here as well. The applications discussed (see Exhibit IV-3) are representative of systems integration requirements only.

EXHIBIT IV-3

Systems Integration Project Applications

- Information management and analysis
- Human resources
- Office automation
- Graphics
- Logistics and distribution systems

Information management is the most frequently mentioned application of systems integration projects. Federal agencies want to share data electronically through their organizations in order to accomplish quickly their day-to-day goals. The agencies' primary need is better distribution of information for analysis.

Human resources and office automation, driving factors for systems integration projects, are also examples of primary systems integration applications. They illustrate the shift to better automation of data collection and analysis by the agencies.

Graphics applications on larger systems, in addition to the standalone integrated graphics systems, continue to increase in a number of agencies for both data displays and mapping. Graphics applications are used in both civilian and defense agencies, such as the Bureau of Land Management's ADP Equipment Modernization project and the Navy's CAD II project.

On the defense side of system applications, upgrades or expansions of logistics and distribution systems are the most prevalent projects. The defense agencies' applications needs are growing in the area of

accounting and procurement. Several new initiatives are in those areas identified for the period of FY 1990-FY 1994.

INPUT's commercial SI project data base was also sampled for analysis of the primary application to determine which areas were being emphasized. The largest applications area was oriented to meeting specific industry needs, such as a banking application for Chase Manhattan Bank, an energy management system for Omaha Power, and an integrated court system for Allen County, PA.

Network applications appeared as the second largest area in the commercial SI market. Typical projects included a remote store communication network for F.W. Woolworth, a corporate SNA network for United Airlines, and a data communications network for Pennsylvania. Operations applications were involved in some of these projects as well.

Finance and administration applications account for a small portion of the commercial systems integration sample. Projects included a direct billing system for Royal Insurance of America, and a materials and purchasing system for ARCO-Alaska. Most office systems projects were small, like the $1.2 million project for the Aircraft Owners' Association.

The commercial systems integration market is different from the federal SI market because it is less granular. The federal agencies tend to acquire systems specific to that agency, whereas most firms acquire systems which may be applicable throughout their vertical industry.

Another difference between the markets is that office systems programs are larger and more extensive in the federal sector. Federal agencies have a greater need to update and integrate multiple levels and types of equipment. Many federal office projects include networks to interconnect widely dispersed offices and branches.

The federal agencies are also replacing more finance and administrative systems than the commercial sector. In response to the Administration's Reform 88 program, a single federal financial system must be implemented by 1992. Major replacements are scheduled for defense and civil agency payroll systems and operations systems; most will be conducted in an SI environment.

D

Case Studies of Systems Integration Contracts

This section presents case studies of systems integration projects awarded at least one year ago. The data was collected from prime contractor project managers. The case studies illustrate how contractors try to manage complex systems needs by providing equipment, software, professional services, and operations and maintenance functions. Summary contract data also shows how different project requirements can affect contract types.

FEDERAL SYSTEMS INTEGRATION PROJECT CASE STUDY

Program Name: Inspector General Network (IGNET)
Department: Army
Branch: Inspector General

Mission Problem/Function: Conversion from a manual data collection, processing, and storage operation to a fully automated system.

Major Tasks Performed:
- Designed and developed hardware and software capabilities to meet requirements
- Provided networking
- Provided encryption
- Provided training, maintenance, and system engineering support

Contract Information:
Type: Fixed Price
Amount: Est. $15 million
Duration: 8 years

Contract Schedule:
RFP Release: 4/83
Bid due date: 8/83
Award: 3/84
Completion: 3/92

Contractor	Company	Function
Prime Contractor	Emhart/PRC	
Subcontractor	Contel	Equipment Maintenance
Subcontractor	Convergent	Equipment/Software

Project Components:

Equipment: $4.5 million
Contractor supplied: Convergent Technologies PHD-010 (140), CP-001 (120), CP-002 (400), SRP (1); Racal-Milgo 1027 (140); AMT printer 2102 (160), Excel 500 (50); Centronics LP 885 (30)

Software Products: $500,000

- Systems Software
  CTOS

- Applications Software
  Convergent Technologies Word Processing, E-mail, data base, document designer, graphics, cluster network, encryption

Professional Services: $3 million

P—Prime Contractor, S—Subcontractor, O—Other

Consulting Services: P
Design/Integration: P
Project Management: P
Education/Training: P

Software Development:

Encrypted data transmission software, DDN Communications Software, User Statistics

Operations and Maintenance: $6 million

The prime contractor is responsible for operations and maintenance support.

Other Products and Information Services: $2 M

Installation
Systems Engineering Support
User Support
Training

Project Status

All sites have been installed as of October 1989. Maintenance and system support will continue through March 1992. Originally, $20 million was appropriated for this contract, but the current funding value (including FY 1990) is $13 million.

FEDERAL SYSTEMS INTEGRATION PROJECT CASE STUDY

Program Name: Repair Facilities Automation
Department: Department of Defense
Branch: Contractor requested that the client not be specifically identified.

Mission Problem/Function: Automate the repair facilities on the shop floors at Department of Defense Centers. It will help manage the repair function while decreasing the cost of repairs.

Major Tasks Performed:
- Designed new methods and procedures
- Designed an automated system
- Provided hardware and software

Contract Information:
Type: Fixed price
Amount: $84 million
Duration: 12 years (including maintenance)

Contract Schedule:
RFP release: 8/86
Bid Due Date: 11/86
Award Date: 6/87
Completion: 1993

Contractor	Company	Function
Prime Contractor	GDS	Design/Integration/Management
Subcontractor	IBM	Hardware Platforms
Subcontractor	Cincom	DBMS and Applied Software
Subcontractor	Ernst & Young	Applications Software

Project Components:

Equipment: $30 million
Contractor supplied: IBM 3090 (7), IBM 4381 (2), IBM peripherals

Software Products: $10 million

- Systems software
  IBM MVS; Cincom Supra

- Applications software
  Manufacturers Requirements Planning II (Cincom), modified by Cincom and GDS

Professional Services: $30 million

P—Prime Contractor, S—Subcontractor, O—Other

Design/Integration: P
Project Management: P
Education/Training: S

Software Development:

Manufacturers Requirements Planning II
Financial Reporting
Interfacing Software

Operations and Maintenance: $15 million

The prime contractor provides maintenance management, and the subcontractors provide specific maintenance functions.

Other Products and Information Services: $3 million

Product Content Software

Project Status

The initial operating capability has been installed at the first site, and is currently being installed elsewhere. This represents Phase I of four phases. The client is very satisfied with the vendor's progress, and the project is going very well.

FEDERAL SYSTEMS INTEGRATION PROJECT CASE STUDY

Program Name: Engineering Research and Technical Support
Department: Transportation
Branch: National Highway Traffic Safety Administration

Mission Problem/Function: Integration of hardware, software, office automation, and networking for greater efficiency and cost savings.

Major Tasks Performed:
- Design and support an integrated computer center
- Design and support an agency-wide Ethernet network
- Design and support an agency-wide, management information system
- Provide agency-wide office automation support

Contract Information: Type: Cost plus fixed fee
Amount: $20 million
Duration: 5 years

Contract Schedule: Award: 8/1/86
Completion: 7/31/91

Contractor	Company	Function
Prime Contractor	Automated Sciences Group	Consulting Services, Design/Integration, Project Management, Education/Training
Subcontractor	ISSI	Programming Support
Subcontractor	UVA	Engineering Analysis
Subcontractor	Kelley Associates	Special Study

Project Components:

Equipment: $3 million
Agency Supplied: Wang VS/100 (6); IBM-compatible PCs (65); VAX Cluster; AT&T 3B2 Cluster; HP 9000/840

Software Products: $2 million

- Systems Software
  VMS, Unix, DOS

- Applications Software
  Fortran, C, Ingres, Oracle, Informix, dBase

Professional Services: $15 million

P—Prime Contractor, S—Subcontractor, O—Other

Consulting Services: P
Design/Integration: P,S
Project Management: P
Education/Training: P,S,O

Software Development:
Off-the-shelf applications were supplied by the prime contractor. Custom-developed software was developed by the prime contractor and ISSI.

Operations and Maintenance: $7.5 million

The prime contractor provides operations and maintenance support.

Project Status

The contract continues in its second option year with one more option year to go. The contract has evolved into a task order contract, although it was not one originally. The client is extremely happy with the progress.

FEDERAL SYSTEMS INTEGRATION PROJECT CASE STUDY

Program Name: Cargo Movement Operations Systems (CMOS)
Department: Department of Defense
Branch: U.S. Air Force

Mission Problem/Function: The Air Force tracks and moves cargo throughout the world. Care of the cargo's condition and status as it moves through transportation channels is basically a manual process today. The Cargo Movement Operations System (CMOS) will provide automated support to the cargo movement environment and allow for more efficient handling and tracking, thus allowing for the movement of more cargo.

Major Tasks Performed:
- Modified systems specifications
- Developing and implementing the entire system, including the integration of all hardware, software, and data communications

Contract Information:
Type: Firm Fixed Price
Amount: $11,958,369.95
Duration: 3 years

Contract Schedule:
Best and Final Offer: 4/5/89
Contract Award: 5/26/89
Completion: 6/1/92

Contractor	Company	Function
Prime Contractor	ERC International	Project Management, Modification, Integration
Subcontractor	Wollongong Group	Data Communications
Subcontractor	CACI	Transportation Analysis

Project Components:

Equipment: $300,000
Vendor Supplied: Sun 386i workstations
Agency Supplied: AT&T 3B2-600G, Zenith Z-248s

Software Products: $8,000 per site

- Systems Software
  UNIX System V/MS-DOS

- Applications Software
  DDN/FTP, DDN/GMTP, DDN/Telnet, DESQVIECO Windows, Prelude E-mail, Oracle RDBMS

Professional Services: $11 million

All services were provided by the prime contractor.

Software Development:

CMOS Increments I and II were custom developed by ERC International.

Operations and Maintenance: $2,080,000

ERC International provides operations and maintenance support.

Project Status: The project consists of three increments. The System Design Review of Increment I has cancelled, Increment II has just begun System Requirements Analysis, and Increment III has been initiated. Over $6 million was originally appropriated for this contract, but in the future the scope of the project will change from the original specifications. The project has been very successful to date.

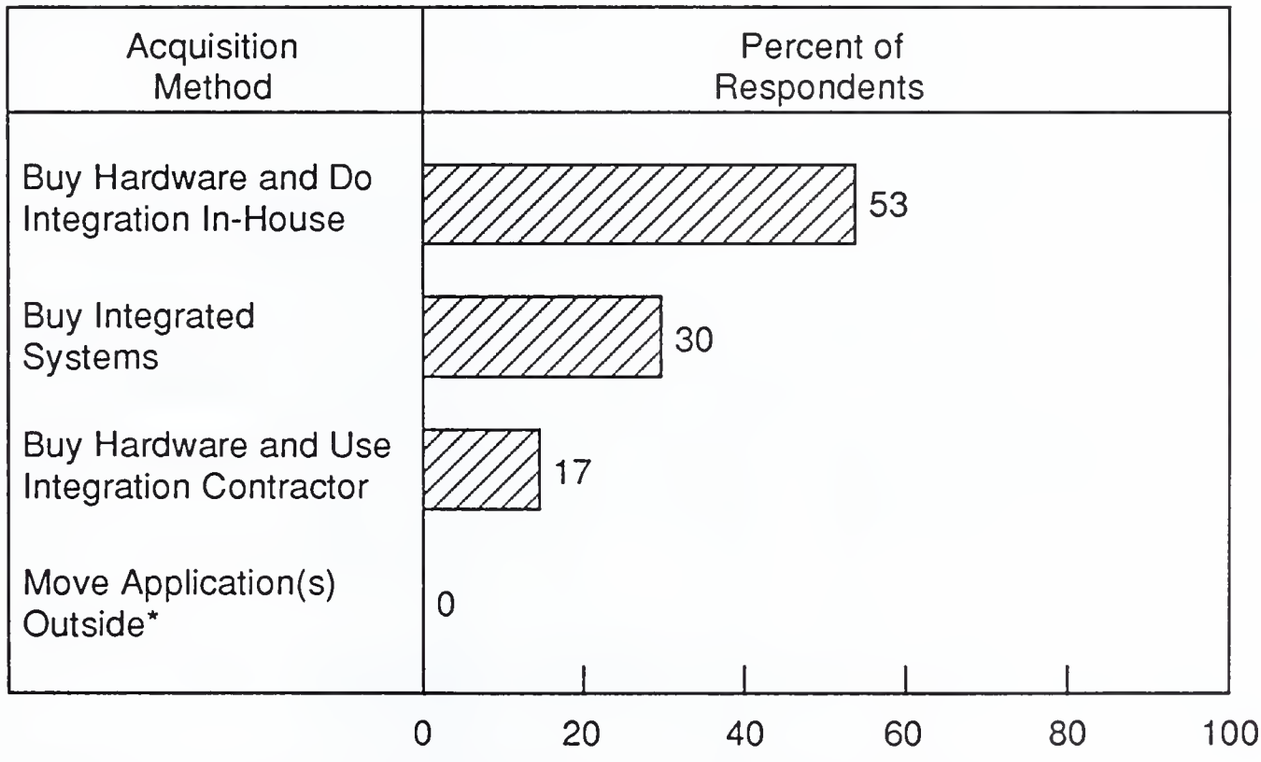
E

Acquisition Plan Preferences

Both the agencies and vendors interviewed in the study were asked to comment on their perception of how integration programs are now acquired, and how they would prefer them to be acquired in the future. Half of the agency personnel interviewed preferred separate acquisition of the system components and performance of integration in-house, as shown in Exhibit IV-4. Nearly one-third of the agency respondents preferred acquiring integrated systems, an increase over previous surveys.

EXHIBIT IV-4

Agency Preference for System Acquisition Methods



*Mentioned as additional method for system acquisition, but not cited as a preference

The remainder of the respondents favored purchase of the hardware separately, along with the use of an integration contractor. Several agencies mentioned moving applications to an RCS or a government data center, but this movement was not cited as a preferable method.

In the commercial sector, decisions concerning the use of internal or external resources were usually based on the scope, technical requirements, timeliness, risk factors, and corporate economics. When an outside systems integration company was retained, it was usually due mainly to the buyer's lack of internal capability and/or resources. Sometimes a buyer's organization had a complete or partial capability, but due to other considerations such as current workload or not wanting to increase the professional staff, a systems integration vendor was retained by the buyer.

The majority of the agency respondents plan to replace or add in-house computers over the next few years, as shown in Exhibit IV-5. Seventy-five percent said that some in-house computers would be acquired to support the agency's primary and secondary applications. This aspect of agency plans was not revisited in the current survey and update because the current agency long-range information resources plans appeared to be consistent with the above observations. Most computers were sized as large mainframes or departmental minis, and will be competitively procured during the modernization or expansion.

EXHIBIT IV-5

Agency Plans to Add In-house Computers

Plan to Add	Percent of Respondents
Yes	75
No	25

INPUT also asked agency representatives to describe the extent to which they planned to acquire or use supercomputers. Sixty-nine percent did not have any planned use of supercomputers within the next five years. Only 19% of the respondents planned to use supercomputers, and an additional 13% were considering some future use (see Exhibit IV-6). However, INPUT has found in other surveys that some agencies are considering using supercomputers for other than scientific applications, such as process control and econometric modeling. Supercomputers will probably continue to have little impact on the federal systems integration market.

EXHIBIT IV-6

Agency Use of Supercomputers

Plan to Use	Percent of Respondents*
Yes	19
No	69
Considering	13

* Does not add to 100 due to rounding

The agencies also were queried by INPUT on their use of outside computing services (see Exhibit IV-7). Sixty-two percent of the respondents were currently using outside computing resources or services to satisfy information processing requirements. The agencies expressed differences between use of other federal agency centers and remote computer services (RCS). Eighteen percent currently used contractor-owned, contractor-operated (COCO) facilities. Agencies have resorted to the use of outside services primarily to alleviate the excess in-house workload for data analysis and scientific applications. These outside services could be replaced by the implementation of a larger, in-house system. Thus large-systems integration projects could potentially satisfy processing requirements currently met by a combination of resources, including outside computing services.

At the time of writing this report, considerable controversy existed over the necessity and success of large-scale systems integration projects. GSA was advocating "downsizing" or a "modular approach" to developing large-systems projects. Many agencies and vendors believe that single-point responsibility and liability is the only way to establish a multivendor environment. INPUT expects this debate to continue until a few highly visible successes or failures take place.

There are also preferences for types of contracts used in SI procurements. Agency personnel indicated a continuing preference for a fixed-price SI contract vehicle, as shown in Exhibit IV-8. Interviewees felt greater motivation to complete the project on time and within budget under fixed-price conditions. Agencies were evenly divided in their preference for cost-plus, cost-plus award fee and a mix of contract types. Only a small percent of the agencies preferred cost-plus fixed fee or fixed-price

EXHIBIT IV-7

Agency Use of Outside Computing Services

Type of Service	Percent of Respondents*
COCO	18
RCS	55
Outside Agency Centers	36

*Responses do not add to 100, due to multiple answers

Note: 62% of all respondents were using outside computing services

incentive contracts. To some extent, the industry had convinced Congress that emphasis on fixed-price contracts did not consider the risk of incompletely or poorly defined system requirements, but shifting leadership patterns may require vendors and their associations to revisit this issue.

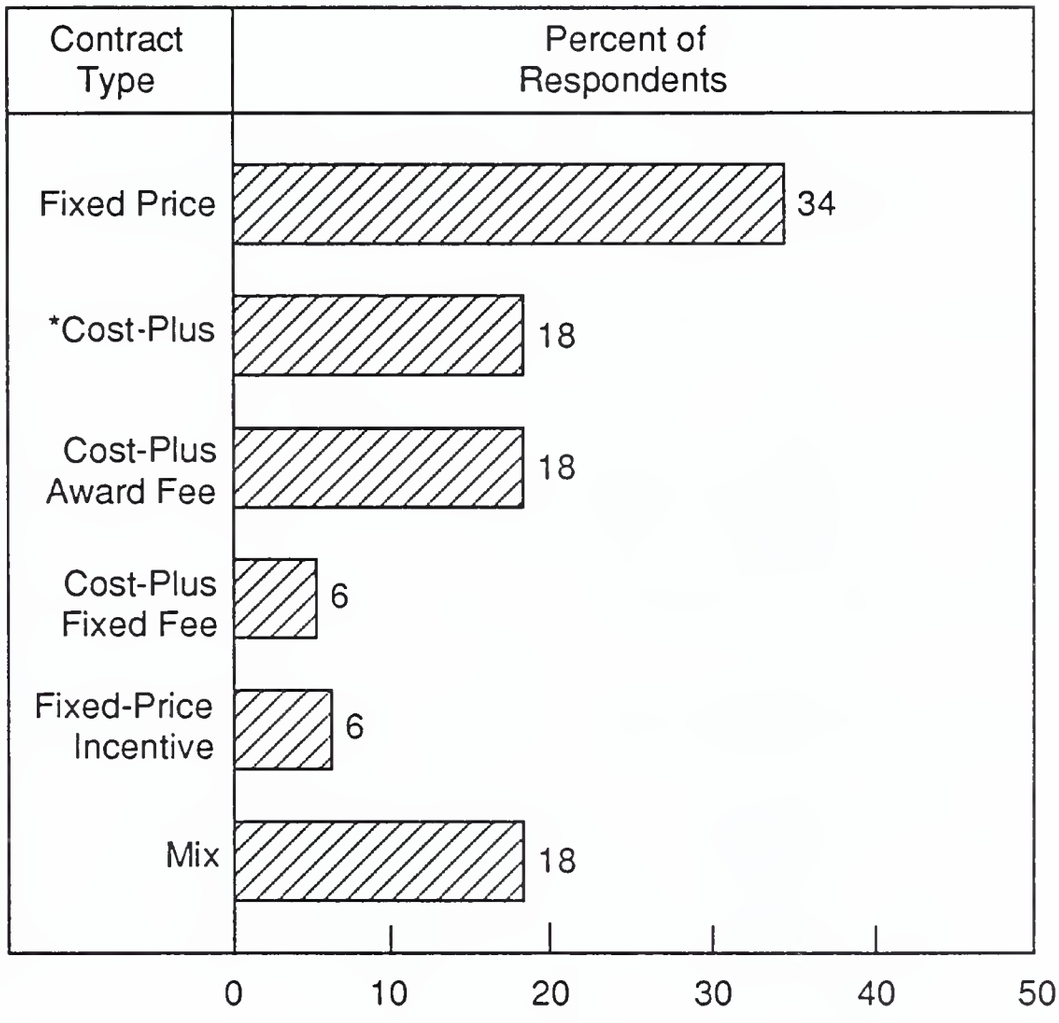
The commercial systems integration world is not as formally regulated. The negotiation process is usually uneventful, and in a majority of cases is completed quickly and efficiently. Just as in the federal government, the core documents used to develop the final contract are usually supplied by the buyer; but the buyer is usually more flexible in altering the terms and conditions as needed.

Agencies were strongly in favor of using professional service vendors for SI acquisitions, as noted in Exhibit IV-9. This preference represents a significant shift from the results of INPUT's previous studies, and suggests more comfort with this group of vendors.

Agencies with prior SI contract experience felt that the systems vendors made design choices that better supported the agencies' operational needs. Hardware manufacturers and communications vendors were used more frequently, whereas a previous survey suggested that the agencies were more inclined to use not-for-profit organizations.

EXHIBIT IV-8

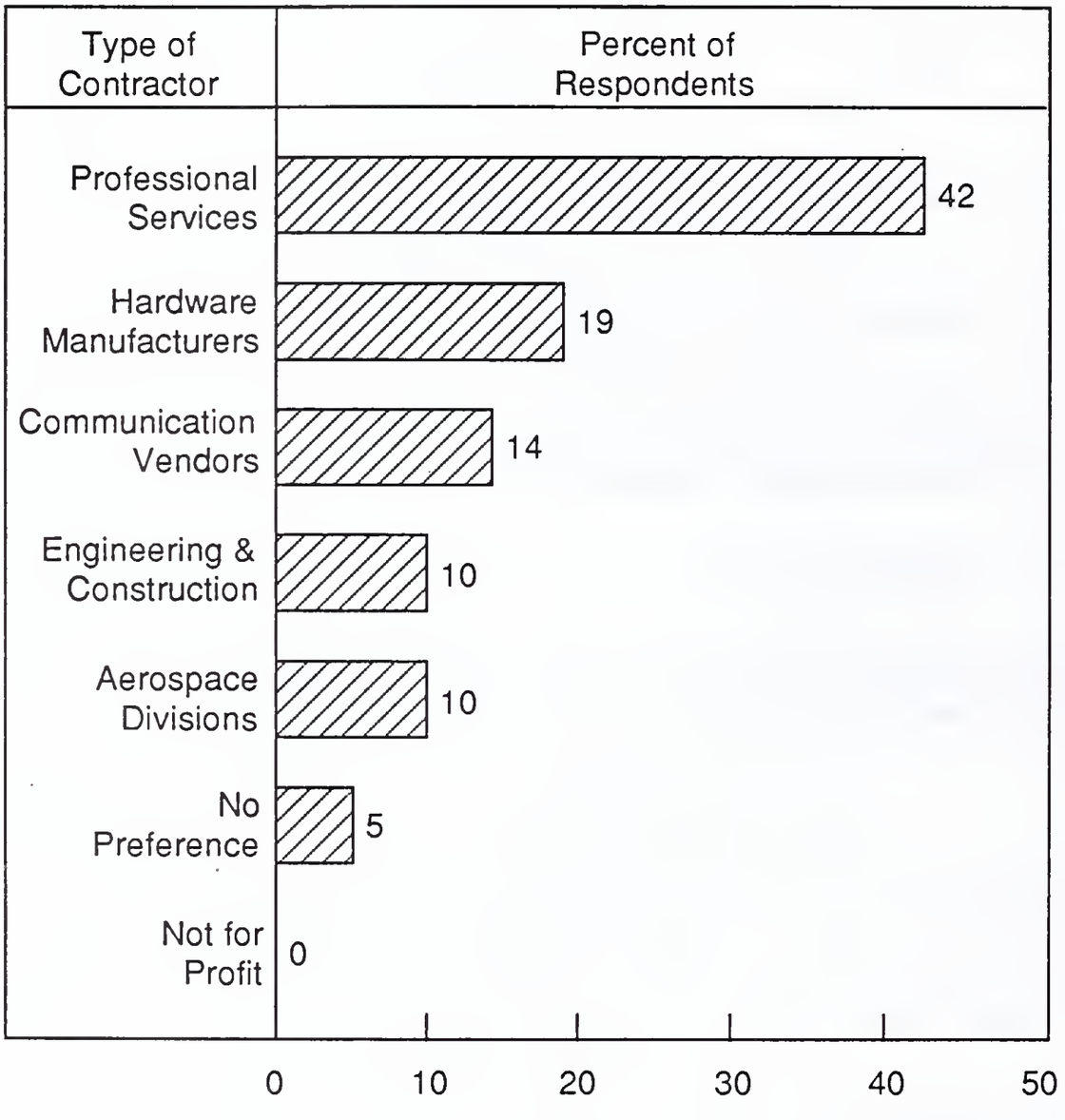
Agency Preference for System-Integration-Type Contract



*Did not identify fee type

EXHIBIT IV-9

Preference for Type of Systems Integration Contractor



Bid selection criteria, while varying among agencies and even among specific projects within each agency, usually involved the following:

- Proposed technical solution; that is, the extent to which the proposed solution meets the requirements
- Cost, although this is considered by contracting personnel as a primary criterion only when two or more vendors propose similar approaches or equipment
- The type of contract. As discussed earlier, the contract should ensure that agencies have some assurances that cost and/or delivery schedules will be met.
- Risk containment procedures, including adequacy of reporting schemes and progress reports

EXHIBIT IV-10

Selection Criteria Significance for Systems Integration Contract Award

Rank	Criterion
1	Technical Solution
2	Life Cycle Cost
3	Risk Containment
4	Contract Type
5	Initial Cost
6	Project Management

Note: Ranking based on average ratings by agency respondents

The high ranking of life cycle cost and contract type is considered a reaction to the budgetary conflicts of project authorization and funding. Risk containment gains importance under CPFF-type contracts because the government assumes a higher proportion of the risk than under FP contracts.

Despite a frequently stated preference for basing awards on something other than cost, most contracts are still decided that way. Whenever a major contract goes to other than the lowest bidder, the loser usually protests. Often, this leads an unhappy congressman to order a GAO investigation. The time available for the GAO analysis is often too short, or reflects an auditor's tendency to equate lowest overall cost as the best solution.

To avoid this development, many contracting officers engage in technical leveling, as discussed in Chapter III. If the technical proposals can be brought into a competitive range, then the contracting officer can award to the lowest price bidder. This will enable him or her to avoid, in most cases, congressional investigations.

The relative ranking of systems integration contractor selection criteria by agencies in the view of the vendors appears in Chapter V.

The technical solution was identified as the primary criterion for selection by agencies in an earlier report. Life cycle cost was listed as the second most important criterion, and previously was seldom used in actual contracting practice. Initial cost was frequently the second most important selection. Agency executives mentioned risk containment more frequently than in past surveys, reflecting a growing concern over systems that have "cratered." However, vendors ranked life cycle cost as the most important selection criterion in our study. As agencies increasingly face the reality of budget limitations, they no longer pay "lip service" to total life cycle costs.

INPUT's research showed that the bid process in the Commercial Systems Integration marketplace is quite different from the approach used within the federal government.

1. Participants

Of the buyers polled, 80% determined beforehand which outside systems integration companies would be invited to bid on the project. INPUT identified vendors by talking to other companies involved in major projects, scanning literature and advertisements, and talking to vendors attending conferences and trade shows. The remaining 20% used an open bidding process and welcomed all outside Systems Integration companies interested in pursuing the business.

2. Bidder Conferences

Bidder conferences were held in 40% of the cases studied, and the remaining 60% scheduled individual meetings with the various vendors. As a result of these conferences or individual meetings, 20% of the companies modified or enhanced their original specifications.

In most cases when the bid was closed, the buyer invested considerable time in prescreening the various vendors' capabilities and expertise. The buyers were concerned about lack of vendor information outlining the various systems integration services and capabilities. Given the investment required by buyer and vendor in bidding a systems integration project, prudent management says to involve only vendors with at least adequate capabilities for the specific project.

Somewhat surprisingly, the research findings indicate no pattern in determining the chosen vendor. Instead, a combination of approaches was used, and in some cases little thought was given to this issue until the vendors bidding the project had submitted their proposals. The most common approach was the overall evaluation of how the vendor proposal measured up to the buyer specification, but other criteria were also identified as important to the selection process.

3. User Criteria

As listed in Exhibit IV-11, industry experience, application knowledge, and cost/performance criteria were ranked the three most important issues in selecting a systems integration vendor. Alliances, widely reported in the press as important, ranked last; but this poor ranking could be due to the transparent nature of the alliances participants from the viewpoint of the buyer organizations.

Buyers' other important criteria included the financial health of the proposed vendor, the expertise and stability of the proposed project management team, a knowledgeable and professional technical staff, and finally, vendors' concern with providing the "best" solution, as opposed to promoting established products and capabilities.

4. References

The two companies registering the highest degree of satisfaction concerning the overall success of the project relied heavily upon references and on-site visits to similar installations. Many of the other companies interviewed also used the same means of establishing vendor capability. Because of the general lack of industry information available (as reported by the buyers from a vendor and project viewpoint), on-site visits and reference checks became a critical means of validating a particular vendor's claims.

EXHIBIT IV-11

Commercial Vendor Selection Criteria

Type	Frequency of Use* (Percent)
Industry Experience	86
Applications Knowledge	86
Cost/Performance	86
SI Experience	79
Project Management Skills	64
Support Skills	64
Service Orientation	50
On-Site Visits	43
References	43
Alliances	21

* Multiple responses permitted.

F

Vendor Performance

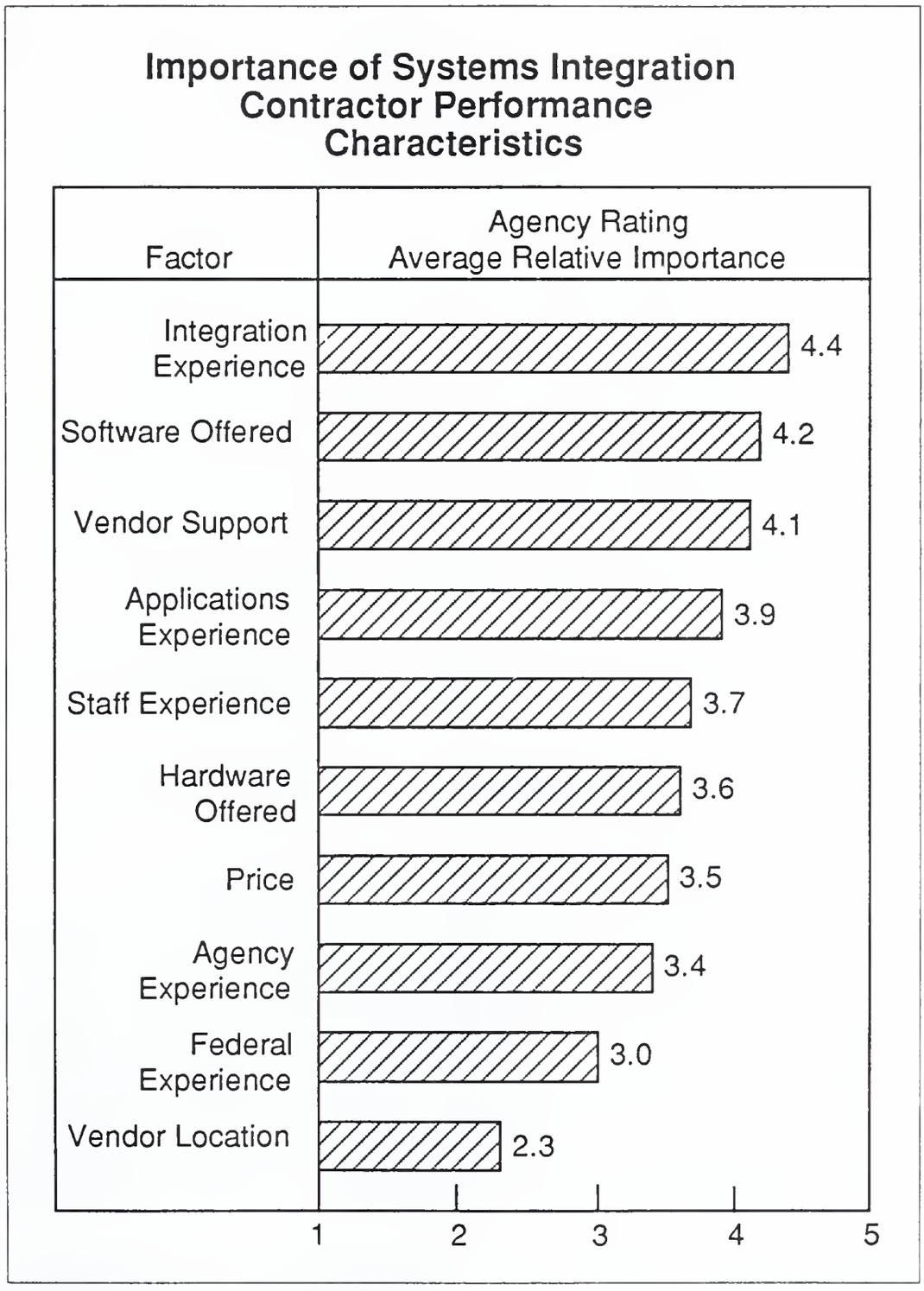
Agencies expressed various opinions about performance criteria and levels of satisfaction. The relative importance of contractor performance characteristics to the agencies interviewed is shown in Exhibit IV-12.

Agencies believe that integration experience is most important and that vendor location is least important. Opinions differed on the relative importance of price and federal government integration experience, but the remainder of the characteristics varied little. Vendor support was also rated high, showing that agencies want reliable vendors that will follow through completely on the project.

The second comparison dealt with the perceived level of satisfaction with the work of systems integration vendors. The agency rating is listed in Exhibit IV-13.

Vendors apparently agreed with agency levels of satisfaction on responsiveness, work quality, and cost control. Vendors believed that agencies were satisfied with their project management, but agencies were not,

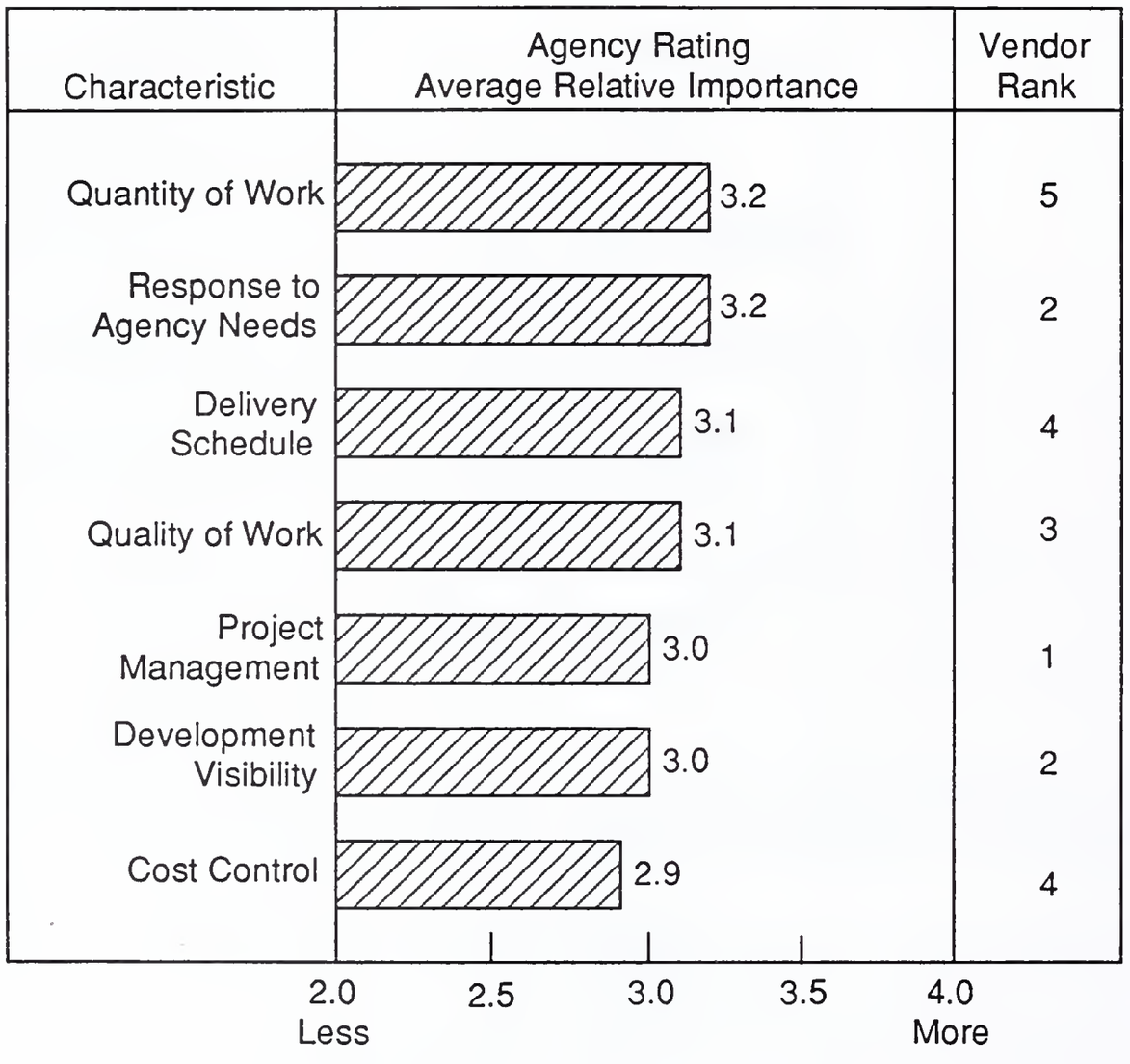
EXHIBIT IV-12



even though both agreed that management ranked sixth in selection criteria. Agencies were substantially more satisfied with the quantity of work than with the quality than the vendors. They assumed that higher quality levels would be a desirable objective for a successful contractor.

EXHIBIT IV-13

Level of Satisfaction with Systems Integration Vendors



G

Trends

Agency representatives were asked by INPUT to identify technological factors that could or might increase agency use of information processing resources. This applies to vendor-furnished SI solutions, because agencies will be looking for these technological factors. Numerous factors were identified. The six that were named most frequently are listed in Exhibit IV-14.

EXHIBIT IV-14

Technological Factors that Could Increase Agency Use of Information Processing Resources

Factor	Rank*
Increased Microcomputer Availability	1
Expanded Networks	2
Expert Systems/Artificial Intelligence	3
Distributed Processing Networks	4
Intersystem Compatibility	5
Software Standardization	6

*Rank based on frequency of mention by respondents

Most respondents identified increased microcomputer availability as the most important factor in increased ADP usage, reflecting continuing agency migration to end-user computing. Expanded networks, expert systems, and distributed processing network availability were considered almost equally important factors. The remaining factors include suggestions for intersystem compatibility and software standardization, which both promote greater use of systems integrators. The adoption of GOSIP and POSIX as FIPS will stimulate agency needs to integrate new and existing systems. Greater software capability will save money.

Agencies were also asked to identify nontechnical factors that impede increased systems acquisition. The various suggestions have been combined into five major factors in Exhibit IV-15. More than half of the respondents identified budgetary limitations as the largest single obstacle. Limitations in funding also contribute to the lack of available skilled staff and the difficulty in retaining them.

EXHIBIT IV-15

Nontechnical Factors that Impede Increased Systems Acquisition

Factor	Rank*
Budgetary Limitations	1
Costs Associated with Acquisition	2
Regulations Imposed on Agency	3
Internal Agreement on Requirements	4
Availability of Skilled Staff	5

*Rank based on frequency of mention by respondents

Fifty percent of the agencies surveyed said they experienced budget constraints directly attributable to the Gramm-Rudman-Hollings Act. Some agencies had suffered delays and cutbacks in acquisitions since 1986. Others have so far escaped the act's impact.

Costs associated with systems acquisition represent the next largest restraint. Complex or lengthy regulations imposed on agencies are also viewed as severe impediments to systems acquisitions. Lastly, a lack of internal concurrence and management interest in extending information automation is a substantial hindrance to increased systems acquisition and use.

In response to the inquiry on the impact of technical standards, a notable 75% of the agency respondents agreed that industrial and governmental activities in the development of technological standards will significantly affect future systems integration acquisitions and operations. The Open Systems Interconnection (OSI) standards and the Government Open Systems Interconnection Profile (GOSIP) protocols will significantly affect systems requirements for administration systems, communications systems, and data processing centers during the next two to three years.

ISO and X.3 communications standards for office automation will probably take effect in four to five years. Productivity enhancement tools and

integrated workstations will then allow even greater access to data generated from different sites. The X.3 communications and X12 communications developments will also affect future agency data transactions and computer-aided government logistics operations, both for the civil and defense agencies. The Defense Department has indicated need for the migration of current TCP/IP to X12 to facilitate employment of EDI for CALS by the early 1990s.

INPUT queried agency respondents on their suggestions for how vendors might make their systems integration services more valuable to the federal government over the next five years. Predictably, the replies varied due to the different types and levels of experience the respondents encountered with vendors. In descending order of frequency of mention, Exhibit IV-16 lists the principal suggestions made by the agencies.

EXHIBIT IV-16

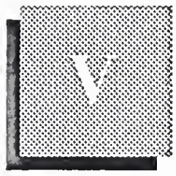
Agency Suggestions for Improvements to Vendor Services

Suggestion	Rank*
Increase Adherence to Industry Standards	1
Increase Planning and Management Skills	2
Increase Level of Experience for Staff	3
Increase Cooperation and Responsiveness to Agency Needs	4
Increase Availability of Compatible Software	5

*Rank based on frequency of mention by respondents

All suggestions reflect agencies' extensive reliance on outside contractors. Increased adherence to industry standards and increased levels of planning and management skills were cited most frequently. The primary reason agencies seek the services of systems integrators is for their project management skills, since they lack the necessary technical expertise to design, implement, and coordinate the multiple hardware and software systems that are demanded to fulfill federal ADP needs. Contractors must continually be in search of trained personnel to keep up with advancing technology. To be successful as a systems integrator, contractors must closely learn the culture of an agency and anticipate hidden agendas. By supplying compatible software systems, contractors will take steps closer to ensuring interoperability, connectivity, and upgradability between systems.

In general, INPUT's findings suggest significant, growing opportunities in the federal government. Agency needs will increase as productivity pressures grow and agency resources become further constrained.



Systems Integration Vendors

A Overview

The federal systems integration market will continue to grow through 1994. Despite doubts about "grand design" systems integration projects, the government will still rely on this method to solve data processing and sharing problems. Some vendors will take greater advantage of this market growth than others.

Vendors increasingly serve a wider range of federal agencies. Further, many SI vendors that had not previously targeted the commercial SI market are now doing so. They wish to broaden their business base to hedge their bets on the federal SI market, and also leverage their federal experience.

Vendors are attracted to the federal SI market by its growth potential and related benefits. Most will try to win major SI contracts, but many others will work toward competitive niche jobs. For most of these vendors, however, SI is only one component of a federal strategy. Unfortunately, most vendors now refer to themselves as systems integrators, even when use of the term does not mean they serve as prime contractors.

Federal SI vendors offer most of the products and services involved in SI bids as prime contractors, and subcontract out others. The products and support services most frequently subcontracted to other vendors include the following:

- Hardware
- Operation and maintenance services
- Education and training
- Network management

B

Market Share

1. Top Systems Integrators

INPUT estimated the ranking of the ten leading SI vendors, based on government systems integration expenditures for FY 1989. These are listed in Exhibit V-1.

EXHIBIT V-1

Top Ten SI Vendors in the Federal ADP Market, GFY 1989

Rank	Vendor
1	IBM
2	EDS
3	CSC
4	SAIC
5	Grumman Data Systems
6	Unisys
7	Boeing Computer Services
8	PRC
9	Martin Marietta Data Systems
10	Control Data Corporation

These companies are under contract to meld different hardware, software, and services with standards and processes into large complex systems. Except for IBM, Unisys, and Control Data Corporation, the top SI contractors for FY 1989 are nonhardware vendors. Complex systems often require multivendor solutions. Hardware manufacturers have traditionally adhered to their own proprietary systems solutions, and offered to manage multivendor projects. However, most hardware vendors have changed their policies to allow multivendor solutions. IBM is an example of a hardware vendor which has effectively managed multivendor solutions.

The following are brief corporate profiles of the top ten SI contractors:

a. International Business Machines (IBM)

IBM's federal organization has participated in the systems integration business for 33 years. IBM's federal SI contracting is provided through its Systems Integration Division (SID).

The new division is structured very much like the former Federal Systems Division (FSD), except for the addition of a few new organizations and some high-level reporting changes. The new division (SID) was created for three reasons. First, the growth of FSD's commercial work made the separation necessary and the old name inappropriate; second, the new division was needed to take advantage of the growing opportunities in the software and services portion of the market; and finally, IBM wanted to send an obvious signal to all customers that systems integration, both federal and commercial, is for real.

Over the past two years, IBM has continued to develop strategic alliances across a broad range of technologies and vertical markets. IBM's strategy seems to focus on strengthening its basic information processing business by providing a complete set of application solutions to meet all industries requirements.

In the past year, IBM has faced problems in federal procurements. Some federal agencies, including the Navy and the National Institute of Health, have been accused of bias toward the company when acquiring large computer systems. A group of six companies wrote to Defense Secretary Frank Carlucci to demand an investigation of this bias. In December 1988, the Department of Defense Inspector General's Office and the General Accounting Office (GAO) began an investigation of seven recent Navy procurements. The two organizations recently reported that the Navy did in fact show bias in favor of IBM. The Inspector General's Office found that IBM used a variety of methods to bias procurements in its favor. The probes did not uncover any violations of criminal laws, so no charges are pending.

Part of the problem stems from the fact that IBM is already dominant in the federal hardware market. Many agencies have IBM equipment in place, so their requirements for additional equipment usually include IBM compatibility. This invites criticism and protests from other hardware vendors, who claim that the procurements are "wired" for IBM.

IBM's largest federal SI project to date is the $3.6 billion FAA Air Traffic Control system modernization. In late summer 1989, FAA stated that IBM had fallen behind schedule in developing the initial Sector Suite system. The company has completed two major phases of the FAA's automation upgrade on schedule, however, and the project is apparently still under its control.

IBM's overall corporate revenue for the first nine months of 1989 was $27.2 billion. This is an increase of 6% over the first nine months of 1988. But the third quarter 1989 revenues increased by only 4.3% over last year's third quarter revenues. The single-digit growth is a weak showing for IBM. This, plus some technical problems with new storage devices, have caused steady declines in IBM's stock prices.

b. Electronic Data Systems (EDS)

EDS was founded in 1962 by Ross Perot, and in 1984 was acquired by General Motors. It has a strong set of capabilities and resources. Its operational data processing experience, including developing large and small data centers, make it very successful in the efficient and cost-effective use of technology. Its alliance with GM Hughes provides it with aerospace industry knowledge and huge financial resources to support bids on the largest opportunities.

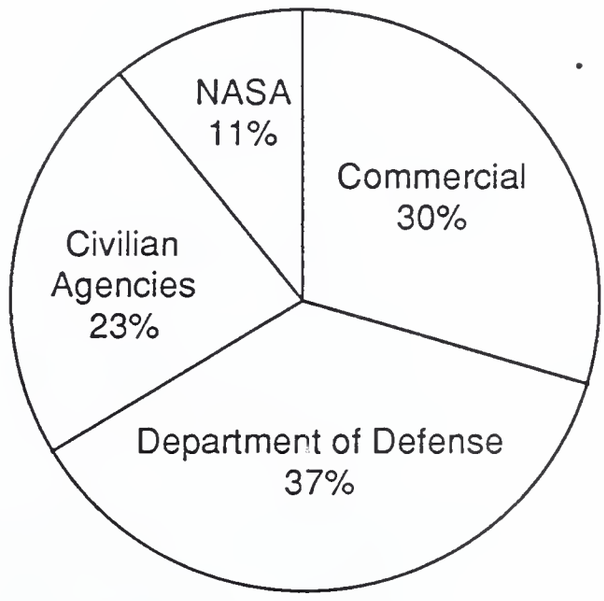
EDS has traditionally relied on IBM for supplying hardware in integration bids. This has led to conflicts when both EDS and IBM bid on such projects. In March 1989, however, EDS entered into negotiations to purchase 20% ownership of National Advanced Systems (NAS). The other 80% was to be held by the Japanese computer manufacturer Hitachi. This investment should provide EDS with a low-cost source of computer hardware, and enhance its strategy to become the leading provider of information processing solutions. Other hardware alliances have been established with leading vendors, including AT&T, Tandem, DEC, and Apple. These alliances tend to shift from one project to the next, as EDS seeks out the most cost-effective hardware solution for each bid.

Total corporate revenue for the quarter ending in September 1989 was $1.37 billion, up from $1.25 billion last year. In 1988, 15% of EDS' corporate revenue was gained from the Government Systems Group activities.

c. Computer Sciences Corporation (CSC)

CSC has been active in the federal systems integration arena for over 30 years. It is a major software developer and systems integrator which manufactures no equipment, but designs, develops, integrates, and operates systems for a broad range of government needs. Exhibit V-2 shows that about 70% of CSC's revenues are based on federal contracts. Thirty-seven percent of these revenues are from the Department of Defense, 23% are from civilian agencies, and 11% come from NASA. The company's revenues grew from $1.15 billion in 1988 to $1.3 billion in 1989. The same year, CSC won eight contracts worth at least $100 million each, with an aggregate lifetime value of $1.7 billion.

EXHIBIT V-2



Note: Figures do not add up to 100% due to rounding.

CSC has a proprietary system development process called Digital System Development Methodology (DSDM), which imposes discipline on the development process, ensuring that all technical, cost, and scheduling goals are met.

CSC in 1989 formed a new Consulting Group, which includes its newly acquired Index Group, CSC Partners, CSC's European operations, and CSC's Communications Industry Services operation. The Consulting Group provides commercial systems integration and related professional services. It is headed by former Andersen Consulting executive Melvyn Bergstein.

CSC's Systems Group provides systems integration services for the federal government. CSC's federal SI contracts include the $140 million Stock Control and Distribution System for the Air Force Logistics Command, and the $300 million Consolidated Data Network for the Treasury Department. CSC is also a subcontractor on two large SI contracts. CSC is developing and integrating applications software for the FAA Advanced Automation System, headed by IBM. In addition, CSC will supply a fully automatic billing system for FTS-2000 with detailed records that will enable agency heads to monitor the costs and usage of their services. CSC in 1989 was selected as one of the Phase I

vendors for the Army Computer-aided Acquisition and Logistics (CALS) program. CSC was also awarded a $111 million contract by the Air Force for its MAC IPS project.

d. Science Applications International Corporation (SAIC)

SAIC was founded in 1969 by a group of research scientists. It is now an employee-owned and operated company of about 9,000 people. SAIC is known as a leader in technology and in research and development.

In 1989 SAIC's revenue grew to $865 million, up from $650 million the previous year. About 85% of the company's revenue resulted from federal government contracts. In September 1989, SAIC hired Gordon Myers, who is responsible for development of major SI projects and key software development projects. Myers was formerly vice president of IBM's SID Commercial Solutions Development organization.

SAIC's largest federal SI contract is the Composite Health Care System (CHCS), a computer-based medical information system which will eventually provide service for Department of Defense medical treatment facilities. CHCS is a $1 billion contract. In 1989 SAIC won NASA Goddard Space Flight Center's Customer Data Operations System (CDOS), whose contract is worth $200 million to $400 million. SAIC also recently developed the prototype for the Department of Energy's Licensing Support System (LSS), an encyclopedia on nuclear waste that will reduce the time for site licensing. SAIC is in a good position to win the $200 million development contract. It also recently won an $84 million contract from the Veterans Administration to develop the Integrated Data Communications Utility (IDCU). In 1985, SAIC won a multi-million dollar contract to develop a fingerprint identification system for the FBI.

SAIC is trying to increase its commercial systems integration business. It will continue to acquire smaller companies to boost this business. It acquired Di-Star Medical Systems Corporation in October, and in 1988 acquired Control Data Corporation's Software Products Division.

e. Grumman Data Systems (GDS)

GDS specializes in providing SI services to a variety of civil and defense federal agencies. GDS has considerable experience in software and hardware engineering, computer graphics, networking, supercomputers, high-level systems architecture, and machine intelligence and correlation.

Grumman's information and other services segment includes the data systems operation, space station program support, and refurbishment and launch preparation of the space shuttle. It also includes service and

maintenance of flight simulators and trainers, and the support of Grumman aircraft.

Sales for this segment grew to $544 million in 1988, up from $453 million the year before. The improvement was due primarily to the space station program support contract, which began in late 1987. The entire corporation has 32,000 employees, and had $3.65 billion in sales during 1988.

GDS had $309 million in sales in 1988. In December 1988 GDS won a $23 million development contract for the Advanced Tactical Air Command Central program. If all options are exercised, the nine-year contract will be worth $115 million. It calls for the design, development, and production of mobile battlefield command centers for the U.S. Marine Corps.

GDS also has high-value contracts from the Air Force. GDS is the prime contractor on the Depot Maintenance Management Information System (DMMIS) program, which could be worth $84 million if all options are exercised. In August 1988 GDS won a $26 million contract for a computer management information system to serve Air Force operations and the Office of the Secretary of Defense at the Pentagon; it could be worth $92 million if all options are exercised. At this writing, GDS is pursuing other major SI projects at the Defense Logistics Agency and Treasury's Financial Management Service.

f. Unisys

Unisys was formed by the combination of the Sperry Corporation and the Burroughs Corporation. The company manufactures and sells a range of systems, from high-performance mainframes to microcomputer-based systems. Unisys can exploit the skill sets of the two merger partners, especially from Burroughs' former subsidiary, Systems Development Corporation (SDC).

The federal business is conducted by the Federal Information Systems Division. SI for the DoD is handled by the Defense Systems Group, formerly SDC. Unisys has traditionally had strong project management, packaged systems software, standard computer hardware, network management/operations, service and repair, and software maintenance.

Some of its more significant systems integration contracts include Navy SNAP I, which was awarded for $36 million in January 1989, and the Army Integrated Procurement System (IPS). Unisys was also awarded a contract for the NOAA Next Generation Weather Radar (NEXRAD) program. This contract, awarded in December 1987, is worth about $450 million.

In August 1989, in response to reduced earnings, Unisys announced that it would cut its work force by 7-8% and would cut annual costs by at least $400 million. For the first six months of 1989, the company posted a $25.1 million loss. In 1989, it has also had some problems with federal ethics regulations and the use of consultants in securing federal business.

g. Boeing Computer Services (BCS)

BCS is one operating division of seven in the Boeing fold. The Boeing Corporation was founded in Seattle in 1916, and is now a diversified aerospace company with 153,000 employees. BCS was founded in May 1970, and has 2,700 employees. Most of its workers provide dedicated support to the parent company. Its major role is to integrate large-scale complex information and telecommunications systems. It provides remote computing (including supercomputing), network services, distributed processing services, systems operation services, consulting services, education and training services, and packaged software products. BCS also provides other Boeing divisions with computing and telecommunications support. BCS' total revenue for fiscal year 1988 reached $1.2 billion. About 90% of the total noncaptive revenue is derived from the federal government.

BCS is a subcontractor to AT&T for Network A of FTS-2000. It provides management systems for the largest procurement in telecommunications history, and is the prime contractor on several government contracts, including the IRS Budget Preparation System and the Inventory Control and Distribution System. BCS also has a contract with the U.S. Army Forces Command to design and install an automated management information system. One of the company's largest federal contracts is the NASA Technical Management Information System (TMIS), under which it provides systems integration services for the Space Station Freedom program.

h. Planning Research Corporation (PRC)

PRC, founded in 1954 and headquartered in McLean, VA, has nearly 7,000 employees and is a leading professional services company. In December 1986, Emhart acquired PRC for $210 million. Emhart also acquired Advanced Technology, Inc., one year later. In April 1989 Emhart allowed itself to be acquired by Black & Decker Corporation, which announced that it would attempt to sell off both PRC and ATI.

PRC has a number of large government SI contracts. PRC is the prime contractor on the PTO Automated Patent System project to develop and install an optical disk-based document management system. Also, PRC is competing against CSC for Phase II of the National Weather Service Advanced Weather Information Processing for the 1990s (AWIPS-90). It is developing a prototype system which will be judged against CSC's

effort for the prize of development and implementation. PRC also won a contract in 1986 for the Treasury Enforcement Communications System (TECS). TECS provides lookout capability against criminals and other violators along U.S. land borders, airports, and seaports.

The company has three main operating groups. The Government Information Systems group is oriented toward designing and integrating systems for the U.S. government; the Business Information Systems group provides nationwide, computer-based, multiple listing services (MLS), computerized systems for group practice physicians, and computer-aided dispatch systems; and the Systems Services group is focused on professional and technical services in support of the engineering and information systems requirements of government agencies.

PRC's total 1988 revenue reached $483.6 million, an 11% increase over the previous year's. Approximately 70% of the 1988 revenue came from government contracts.

i. Martin Marietta Data Systems

Martin Marietta Data Systems was formed in 1970. It is part of the Martin Marietta Information Systems Group, along with Information & Communications Systems and Air Traffic Control Systems. The group's primary activities include the design, integration, and servicing of a broad range of information management and engineering systems, combining communications and information processing for command, control, communications, air traffic control, simulation, telecommunications, and integrated communications networks.

Martin Marietta appears to have suffered a significant setback in late 1988 when the FTS-2000 contracts were awarded to its prime competitors, AT&T and Sprint. Martin Marietta is reputed to have spent $50 million on its bid and proposal effort for FTS-2000. Although the loss appears to have limited the number of other opportunities on which the company could bid, the Information Systems Group still has strong revenue flow from large existing SI contracts. These include the FAA Systems Engineering and Integration (awarded in 1984), worth nearly $800 million, and the Navy's Pay and Personnel Administration Support System (PASS), also awarded in 1984, worth more than $200 million. Martin Marietta also won a $44 million contract in 1989 from the Social Security Administration in Baltimore.

j. Control Data Corporation

Control Data provides computer hardware, associated maintenance services, and a range of information services for business, scientific, and engineering applications to clients worldwide. Although the company was once known almost entirely for its hardware, its computer-based

services and systems integration businesses now account for over 60% of its revenues. In 1988 CDC had revenues of $3.6 billion, an increase of 8% over the previous year. As a result of asset sales and write-offs, CDC expects to be a $2 billion company in 1990.

During the past year, CDC has sold off many of its divisions. These sales reduced its debt, brought in extra cash, and allowed it to concentrate on its primary products and services.

- In December 1988, CDC sold its Scientific Information Systems (SIS) division to Power Computing Company, a unit of Babcock & Wilcox. SIS, which operated within CDC's Computer Products Group, provided remote data processing services for scientific and engineering applications.

- In March 1989, CDC sold its Control Data Institutes in West Germany and France to Australian-based Computer Power Group Ltd.

- In April 1989, CDC announced a $490 million restructuring plan which included the following actions:

- CDC streamlined its Computer Products Group, and has focused the group's business on providing high-performance computing products for engineering and scientific users, particularly in government and the automotive and aerospace industries, and tools to manage data in integrated computing environments. In addition to offering its Cyber workstations and mainframes, Computer Products has an OEM agreement with Silicon Graphics and joint marketing agreements with Convex and Cray Research.

- CDC discontinued its ETA Systems supercomputer operation. Although ETA achieved a number of technological successes, it had sustained significant losses (estimated at $100 million in 1988) and was not expected to be profitable in the near future.

As a result of the streamlining of its mainframe business, discontinuing ETA, and reducing corporate staff, CDC cut a total of 3,100, or 9.1%, of its worldwide workforce.

In May 1989, CDC sold Action Data Services to Primerica Corporation. Action Data Services, which operated within CDC's Information Services Group, provides on-line, real-time processing and support products to consumer credit companies and other financial service institutions in the U.S. and Canada. Action Data Services has estimated revenue of $23 million in 1988.

In June 1989, CDC sold its Control Data Institutes in the U.S. and Canada, as well as the Institute for Advanced Technology, to Human

Capital Corporation. Also in June, CDC sold Imprimis Technology Incorporated, its disk drive subsidiary, to Seagate Technology for approximately $450 million in cash and securities. CDC will have an approximately 18% interest in the combined companies. For CDC, the transaction means a potential reduction in debt, additional cash for working capital, an ongoing investment in the OEM disk drive business, and the opportunity to concentrate the company's efforts and resources on the growth of its systems and services businesses.

In June 1989, CDC sold its European third-party maintenance business to Thomainfor, a subsidiary of Thomson-CSF of France, and in July 1989 signed a letter of intent to sell the remainder of its Training and Education business to William R. Roach & Associates. CDC will retain a 20% interest in the new company Roach & Associates is forming.

In October 1989, CDC sold its third-party maintenance business in the U.S. to Bell Atlantic. This unit consisted of about 1,000 people and generated nearly $100 million in annual revenue. Bell Atlantic will merge this business with its Sorbus subsidiary.

CDC supplies and serves the federal government through its Government Systems organization. CDC's big SI win came during October 1989. The Army awarded its Corps of Engineers Automation Plan (CEAP) Phase I-A, worth approximately $365 million, to CDC. CEAP I-A will replace Harris and Honeywell computers and provide software, communications equipment, and support services. CEAP will serve Corps Field Operating Activities and the Corps of Engineers headquarters. CDC will connect about 16,000 workstations, terminals, and PCs at about 70 sites, and install and operate two network control nodes.

Other contractors visible in both prime and subcontractor roles in the federal SI market include the following:

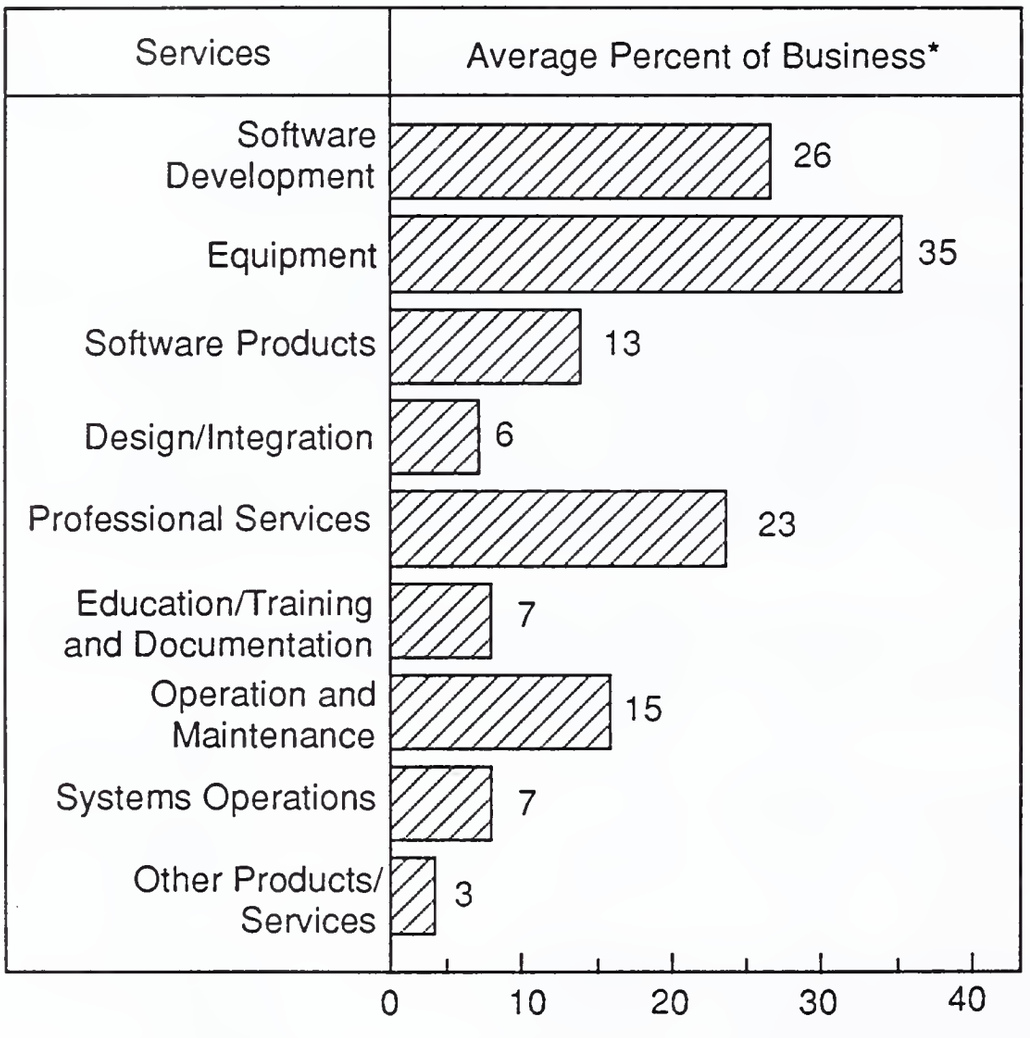
- TRW
- Systemhouse
- BDM
- Arthur Andersen
- GTE
- Advanced Technology
- OAO Corporation
- Automated Sciences Group
- Harris
- Lockheed
- ITC
- STX
- Federal Data Corporation
- Sysorex
- Honeywell Information Systems
- McDonnell Douglas
- General Dynamics
- American Management Systems
- Vanguard Technologies
- Litton Computer Services
- Oracle Complex Systems
- Centel
- Intergraph

2. Characteristics of Systems Integrator Respondents

INPUT asked vendor respondents to estimate the percent of their company's federal integration business by specific categories of products and services. The data reflecting their responses is presented in Exhibit V-3.

EXHIBIT V-3

Federal Systems Integration Business by Service Category



*Percentages do not add to 100% due to averaging

Providing equipment accounted for 35% of federal systems integration business for contractors. While equipment is still a large part of the SI business, nearly two-thirds of the revenues come from other sources. Software development and other professional services accounted for approximately 25% each. It should be noted that respondents had difficulty in responding to this question, and to a similar question that asked them to select revenue ranges for each category of services and products offered. Vendors competing in this market generally do not track their SI revenues by product and service categories, so the potential for error in the results is large.

Respondent vendors represented large corporations having average total corporate revenues in excess of $500 million. This figure does not represent their federal revenues, or, as a subset, their federal systems integration revenue. The average number of employees involved in federal market efforts was 1,615, which represents 4.1% of the average number of total company employees (see Exhibit V-4).

EXHIBIT V-4

Summary Corporate Data of SI Respondents

Total Corp. Revenue ($ Millions)	Total Employees	Federal Market Employees
507.2	38,944	1,615

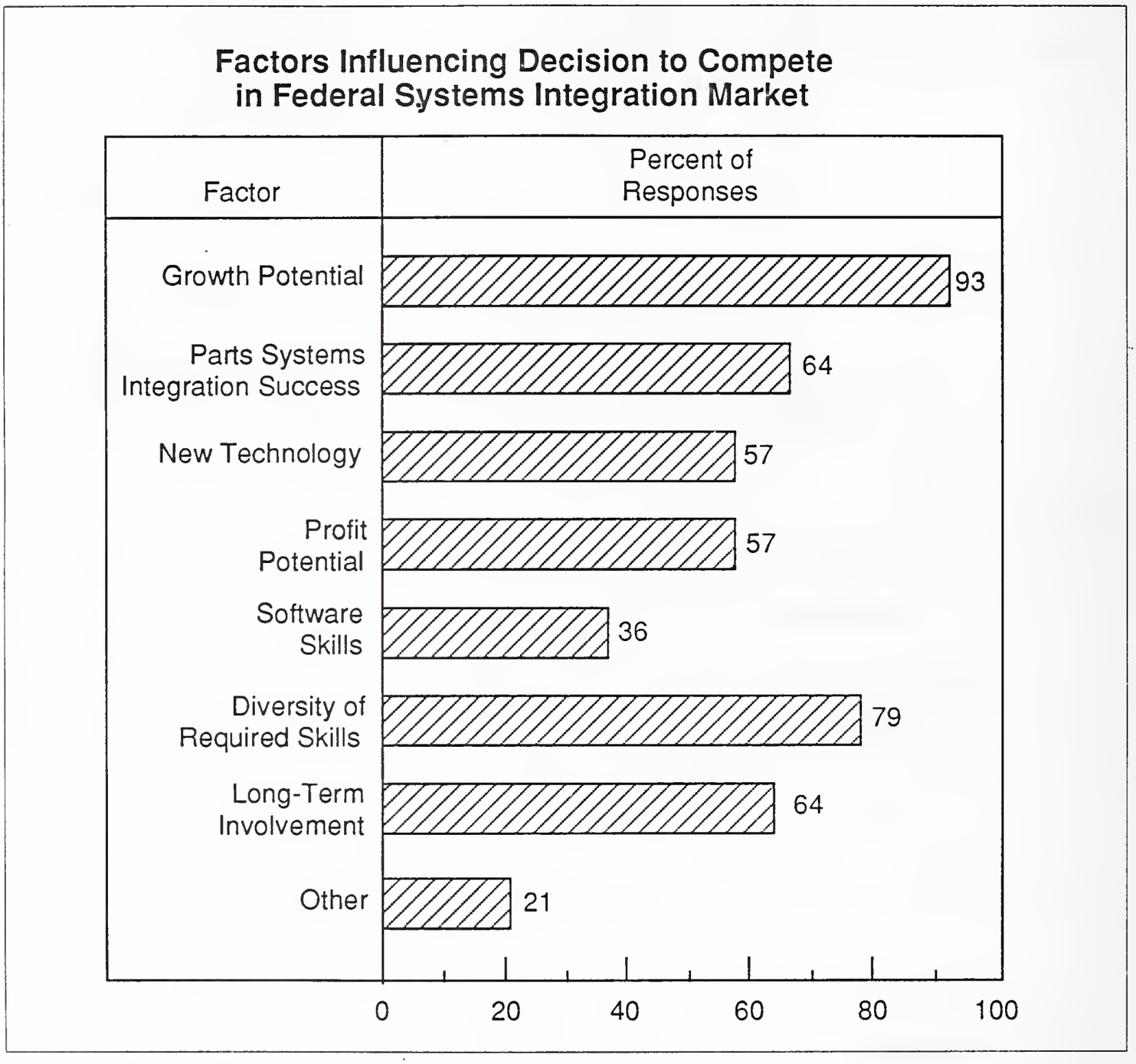
C

Attractions of Federal Integration Contracts

1. The Decision to Compete

Both federal-government-based and nonfederal-government-based vendors are attracted to the federal systems integration market by its growth potential and related benefits, as shown in Exhibit V-5. Vendors were optimistic about the future for their companies in the federal SI market. The data suggests that those interviewed for the 1989 report were established players with the accompanying skill sets needed to offer a wide range of integration services to address federal information processing requirements.

EXHIBIT V-5



The majority of those interviewed cited anticipated growth of the federal SI market as a key factor influencing their company's decision to compete for SI opportunities. Almost 80% believed their companies had the diversity of skills necessary to provide systems integration functions. Past SI program success and long-term involvement in the market were listed by over 60% of the respondents. The opportunities for profit potential and application of new information technology to government needs were the next most frequently cited factors.

Companies wanting to enter the federal systems integration market appear to need alliances with vendors that have been successful in providing SI solutions, in order to learn the skills necessary to establish a reputation for themselves.

2. Procurement Approaches

Vendors competing for the federal systems integration market share employ one or more of several approaches to capturing new business opportunities. Respondents to this year's survey will use a few approaches to win SI contracts, but they did state they will pursue major SI opportunities more than any other procurement approach, as seen in Exhibit V-6.

EXHIBIT V-6

Vendor Procurement Approaches to Federal Systems Integration

Procurement Approaches	Rank
Major SI Opportunities	1
Competitive Niche Jobs	2
Basic Ordering Agreements	3
IDIQ Contracts	4
Sole-Source Need Jobs	4
Other	5

* Rank base on frequency of responses

Competitive niche jobs will be the next most active procurement approach pursued by vendors, followed by basic ordering agreements and indefinite-quantity, indefinite-delivery types of agency contracts. The sample of SI appear to have the technical resources, reputation, and procurement savvy to compete effectively in this highly competitive market. Most vendors cannot afford to focus solely on the SI market at the expense of other market opportunities, so SI forms only one component of a federal-market-oriented product and service offering.

In the commercial SI market, the procurement approach is strongly affected by the strategic planning process. Commercial market selection

is usually fairly narrow, with one or two alternates if the primary vertical market does not produce contracts. Opportunities that do not fit within the limits of the tactical business plan or do not focus on the longer term strategic goals must be declined before any serious resource commitments take place.

Most vendors have focused on one or more vertical industry markets, where a successful implementation can be leveraged to other clients in the same industry or enhancements to the original contract. This reflects the importance of application experience. More recently, however, specialists in cross-industry (non-industry specific) technologies have teamed with industry-specific vendors to improve prospects of awards.

3. Agency Opportunities

Systems integrators' views on future SI opportunities at federal agencies are presented in Exhibit V-7. Most contractors foresee DoD opportunities decreasing rather than increasing. Approximately 40% of the contractors predict their SI opportunities will remain the same among DoD agencies.

EXHIBIT V-7

Vendor Views of Agency SI Opportunities FY 1989-FY 1994

Agency Type	Increasing	Decreasing	Remaining the Same
DoD	25	33.3	41.7
Civil	72.7	0.0	27.3

The vendor views of civilian agency opportunities were extremely positive. Almost three-quarters believed there will be an increase in SI projects, while the rest do not see the civilian market changing during the FY 1989-FY 1994 period. The civilian agencies lagged behind the DoD in ADP modernization during the early 1980s. INPUT believes this shift in SI opportunities is due to civilian agencies finally catching up to their DoD counterparts in modernizing their operations. Technology advances—e.g., image processing systems and office automation products—are making it easier for agencies to automate many functions.

When asked to specify particular agencies that offered the most attractive SI opportunities for their companies, vendors always cited at least three agencies. Exhibit V-8 lists those agencies that received multiple mentions by respondents. Additional agencies cited by vendors included the following:

- Department of Commerce
- Department of Interior
- Department of Agriculture
- Department of Education
- Department of Health and Human Services
- Social Security Administration
- Securities and Exchange Commission
- Environmental Protection Agency
- Intelligence agencies
- Department of Housing and Urban Development

EXHIBIT V-8

Agencies Offering the Most Attractive SI Opportunities

Agency	Percent of Respondents
Navy	50
Army	40
Air Force	30
NASA	30
Transportation	30
GSA	30
Justice	30
Energy	30
Treasury	20
SSA	20

Systems integration opportunities exist across a wide spectrum of federal agencies. Vendors in INPUT's sample do not expect to concentrate their activities in one or two agencies, but pursue contracts wherever SI opportunities are presented.

D

Commercial versus Federal Systems Integration

1. Market Differences

The federal government has relied on systems integrators to develop, upgrade, or replace automatic data processing systems for over thirty years. Commercial systems integration, with some of its roots in federal SI, has both striking similarities to and differences from government contracting (see Exhibit V-9).

The commercial sector customer is less likely to have the legal or technical background required for many projects, and this knowledge is often available only in pieces from numerous personnel within the client organization. The federal government, on the other hand, has established project offices including both technical and legal representatives who speak for the sponsoring agency.

A key difference of vendor characteristics is the formality with which vendor reputation is evaluated as a part of the bid selection procedures in the federal marketplace. In most cases, a vendor's estimated versus actual performance on cost and schedule measures is recorded (the Defense Contract Audit Agency does this for Defense, but makes the evaluations available to all agencies). Agencies use this historic information to weigh specifically and formally the vendor's past performance.

In the commercial world, a federal track record of successful implementations may be desirable and leverageable. Customer business knowledge is a key requirement because the commercial customer looks to the vendor to offer a business solution. State and federal agencies are more specific about the desired solution, at least functionally, and less dependent on vendor business consulting/recommendations.

The business conditions associated with the two markets are widely divergent, with some definite advantages to the government market. The federal agencies advertise in the Commerce Business Daily about upcoming solicitations, and describe key programs in publicly available documentation. Commercially, the vendor is nearly totally dependent on the sales force for leads.

The requirement for competitive bids for expenditures over $100,000 in the federal sector has no counterpart in the commercial world. While competition is a vehicle for the client to achieve the best solution at the best price, other factors (vendor reputation, comfort level with the vendor, etc.) do come into play. Further, the requirements for competition

EXHIBIT V-9

Commercial versus Federal Systems Integration Characteristics

Characteristic	Commercial	Federal
Customers		
Requirements knowledge	Low	High
Technical knowledge	Variable	High
Interface	Multiple	Single
Vendors		
Vertical expertise	Preferred	Mandatory
Customer base	Leverageable	Reference
Business knowledge	Required	Optional
Reputation	Media-based	Historic
Business Conditions		
Lead generation	Field sales	CBD/budgets
Competitive bids	Optional	Required
Bid complexity	Variable	High
Expenditure commitment	Deferrable	Guaranteed
Risk exposure	High	Contained
Contract type	Fixed-price	Combination
Price restrictions	Competitive	Ceilings
Bonuses	Unlikely	Awd./incent.
Penalties	Unlikely	Exception
Profit potential	High	Limited

are such that agencies may not generally specify name brand products in the request for proposal (RFP). The federal process is more open and public, fostering a great deal of competition in which discounting or fixed-price bidding is frequent.

Competitive bidding in the federal sector makes for complexity that involves more time, effort, and money on the part of the vendors, with no assurance of award. Bidding expenses are recoverable, but stringently controlled.

The trade-off is that once the process starts in the federal sector, the expenditures are virtually guaranteed, or termination costs are paid to close the project down. In the commercial area, expenditure commitments may be deferred or withdrawn at the client's choosing, with no recourse for the bidding vendors. Bill collecting also sometimes presents a problem in commercial contracts.

The risks to the contractor appear to be much greater in the commercial marketplace. The contracting rules in the federal arena lead to compliance with the letter of the specifications and some measure of risk-sharing with the client agency. The absence of these rules in the commercial marketplace creates an environment where the specifications are more at issue and, consequently, more subject to interpretation (and misinterpretation), creating the prospect of contract performance suits.

Unless the contract is fixed price, federal regulations may specify price ceilings. Fair pricing regulations specify that profit may not exceed 15%, and permit agencies to audit vendor records to verify these conditions. The commercial sector has no counterpart rules; competition and demand determine the acceptable price range.

Vendor capabilities in the commercial sector are usually based on written proof, previous success testimony, or live test demonstrations simulating a critical function of the desired system. In the federal marketplace these capabilities are frequently required to be "proven" by scores under the "Weighted Guidelines," actual performance against standards (benchmarks) established for the project's system, or "compute-offs" against competitors.

Pricing strategies differ. Commercial jobs are frequently fixed-price without bonuses but with penalties; government contracts are typically fixed-price and cost-plus for medium-sized jobs. Further, it is not unusual for the government to reward a contractor for a low-price bid (award fee) or provide incentives for beating cost or schedule estimates.

Contracts of federal agencies require in-depth reviews of component performance to verify and validate a contractor's work. This practice is found less frequently in the commercial arena.

The commercial/federal SI market distinctions revolve around the formality and regulatory backbone of the process. Some of these more formal practices are being adopted by the commercial market, where exposure to new regulations makes the benefits obvious. Commercial clients will eventually adopt the practices that protect them.

2. Commercial and Federal Market Directions

Respondents to an earlier INPUT survey forecasted a healthy revenue growth potential from both existing customers and new prospects. In general, the vendors interviewed reported that approximately 50% of their new business came from existing clients, and the remainder from other sources. Although the numbers varied significantly between individual vendors, they were fairly consistent for the established competitors. Exhibit V-10 summarizes the growth forecast.

EXHIBIT V-10

Respondents' Forecast of SI Revenue Growth

Sector	Percent		
	Low	High	Average
Commercial	10	35	26
Federal	10	30	18

E

Strategies for Success

Several key strategic elements must be considered in entering the federal SI market. Containing the risk element and consciously managing each project to reduce the possibility of failure is an essential part of continued participation in the market and the future of SI procurements in general. The vendor's reputation plays a key role in the proposal evaluation process.

To be successful in the federal SI market, the vendor must acquire a comprehensive understanding of the federal information systems acquisition process. Systems design, programming, and project management talent are the second most important components of the vendor's strategy; the first is a ground-level understanding of the procurement rules. These qualities are needed to solve increasingly complex technical problems.

SI offers federal vendors the opportunity to capture agency accounts. Because of the critical importance of these systems to the end user, and because the contract will be multiyear, the vendor has an excellent opportunity to develop a unique customer relationship to replace existing relationships.

Moreover, most, if not all, SI projects are functionally so complex that no single vendor can usually expect to satisfy the user's requirements alone. Agency requirements include the following: complex communications links, mixing older and advancing technology in networks and LANs, and converting older software into new. As a result, leases between vendors and agencies will be formed that will be difficult to compete against or break. It is therefore crucial for vendors to choose, early on, partnerships that serve their best long-term, strategic interests.

To prepare properly for the federal SI competitive environment over the next five years and beyond, vendors now must choose the services, agencies, and skills that will be the focus of their SI efforts. Vendors can then identify those capabilities, products, and services needed to complement their own catalogs and can begin selection of the ideal partner or partners that can not only provide the skills needed but enhance the vendor's image and therefore the likelihood of obtaining business.

1. Growing Demands and Staff Shortages

Demand from all agencies for additional support is ever increasing. Systems integration projects are seen as promoting efficiency in the civil agencies' administration systems and savings in the DoD.

- Agencies have a need for networks that tie inter- and intra-agency groups together, especially in large, geographically dispersed organizations. They also need networks that tie government buyers and sellers together for electronic exchange of data ranging from orders to invoices, bills of lading to receipt-of-goods acknowledgements, and the like.

- The development of efficient and effective office information systems permits document exchange capabilities between various media (data, test, image), multiple layers of computing (personal, departmental, and agencywide), and various types of equipment from a multitude of vendors.

Many of the existing data processing systems lack the transaction speed and size to satisfy requirements. The aging of equipment in the face of increasing demands requires that obsolete systems be replaced on a timely and continuing basis. This concern becomes all the more urgent as technology advances and offers new capabilities. "Supersystems" have moved from the "desirable" to the "necessary" category. These systems integrate several applications bound to fourth-generation languages, agency data base management systems, data that ranges from the personal level to the agency level and beyond, and end-user tools ranging to intelligent workstations requiring mainframe links.

Although many federal executives want to apply these technologies, few total solutions are available to link information systems to overall agency plans. And, to the chagrin of many organizations, the internal staff skills to handle the technical demands of these integration efforts are weak or unavailable.

This apparent lack of in-house skills has often been blamed on adherence to OMB Circular A-76 policies, which have reduced in-house staffs. Loss of personnel at central design activities appears to be more related to the lack of growth opportunities in-house and the availability of better paying jobs in the private sector. Hiring freezes dictated by budget cuts (including the GRH effects) have reduced agency capabilities to maintain existing systems. Where the systems are critical to mission fulfillment, development efforts continue with little regard for current budget effects.

In most cases, demand for new and better systems has outstripped the ability of the internal staff to meet the requirements at all, let alone on time and within budget. The staff is simply too mired in day-to-day operations to meet new requirements. Even if staff time were available, complex problems which often require multivendor solutions are beyond the capabilities of the personnel. Furthermore, internal development can be costly in terms of delays in other, less critical projects.

2. Pervasiveness of Information Systems

Agency management has shown an increasing desire to automate the very core of its mission activities. In the current constrained budget environment, agencies cannot wait for internally developed solutions in such areas as financial decision support, support to the public, and management reporting and logistics.

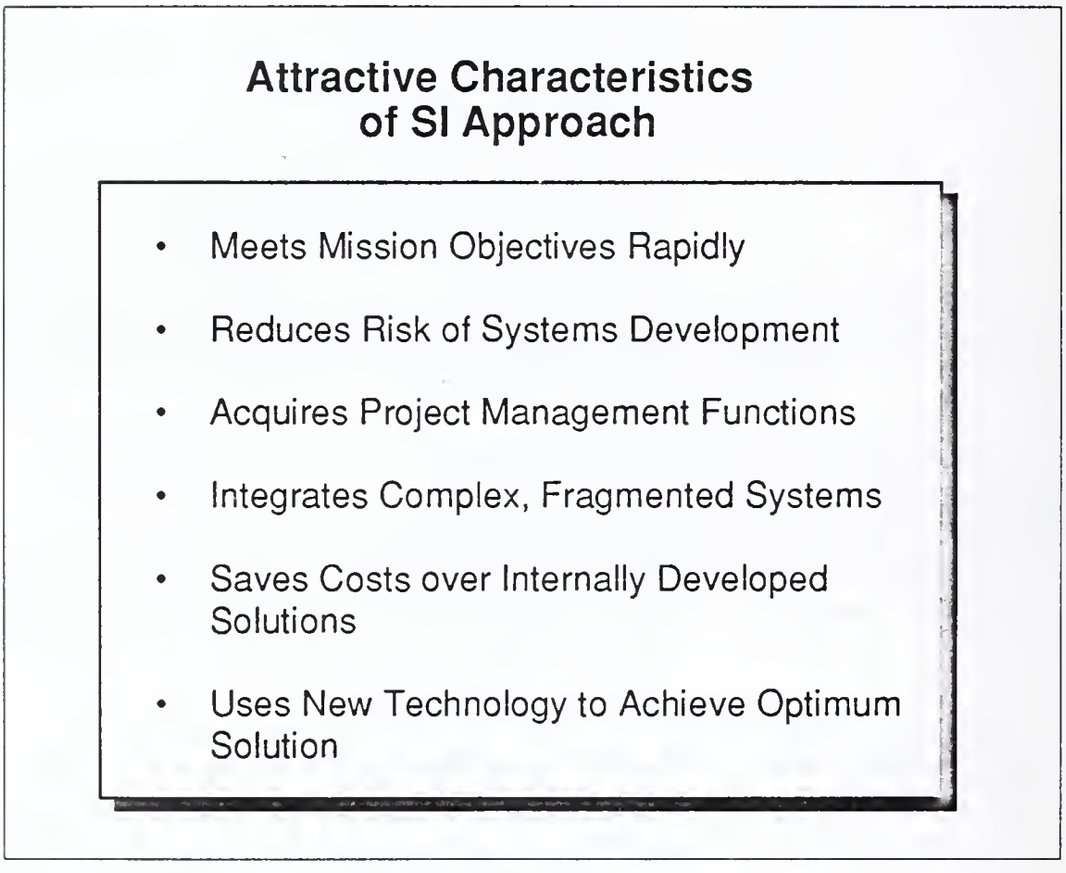
This pervasiveness has also caused a concern for the proper management of the agency's information systems assets (spurred by the Paperwork Reduction Act), including hardware, personnel, and data/information. Agencies are now proactive, rather than reactive. This new orientation requires the containment of costs and the leveraging of assets, the reduction of maintenance costs, and the prioritization of development efforts.

3. Demands for Productivity

Management has also focused on increasing productivity throughout the organization. Management organizations feel that part of the problem with the lack of growth in output that has followed significant investments in information systems is the technical-absorption bottleneck. The absence of a strong agency SI plan (despite A-130 requirements) has led to fragmented systems, and the proliferation of "solutions" has caused not only confusion among possible directions, but also more fragmented systems from ill-fitting packaged solutions.

From the agencies' perspective, then, systems integration has several attractive characteristics, as shown in Exhibit V-11. First the integrator assumes at least some of the risk of development. At once, this starts to relieve the clients of the worry that the system will be built at all, and provides greater assurance that the project will be completed on time and within budget. After all, it is in the contractor's best interest to bring projects in promptly: bringing in a project ahead of schedule saves money. If the integrator fails for any reason, the agency client risks only the time and money to the point of failure, and can point to a sole source for accountability.

EXHIBIT V-11



By depending on outside contractors to fulfill project management functions, the agency hopes to be relieved of the time-consuming and potentially confusing logistics of finding and controlling several contractors.

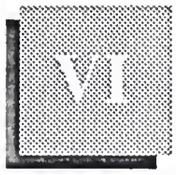
The assumption is that the integrator has already or will soon develop solid business and technical relationships with the vendors involved in the solution, and that these relationships will smooth the interaction of multiple vendors. In the worst case, these vendor problems get passed on to the integrator, not the client.

In an SI effort, the integrator becomes responsible for integrating divergent and incompatible products. This arrangement usually requires a level of technical sophistication beyond the user organization's capability. Office information systems, for example, require a strategic office systems architecture that incorporates and interconnects multiple media, levels of computing, and functionality. These electronic offices require highly advanced communications and integration of data, information, and knowledge bases.

The agency also hopes to capitalize on the integrator's industry and applications experience in both the development and postimplementation phases. The project involves state-of-the-art and state-of-the-industry expertise which the vendor will bring to the effort.

The agency views the potential economies of scale offered by the integrator as a plus. If an integrator is working on multiple projects or has an established distribution channel for products from other vendors, products and services are probably being acquired in such volume or with such regularity that the integrator will get a price break which will be passed on to the client.

A systems integration approach also solves the problem of unavailable in-house project management skills. INPUT studies consistently show that data processing management feels that their agencies lack project management skills and certain technical skills, especially systems design. Many, if not most, MIS departments have mediocre records of completing major projects on budget and on time. SI solves this problem by transferring responsibility to a third party that can demonstrate these skills. Without loss of authority, agencies abdicate the responsibility to outside parties, and the work gets done more effectively.



Key Opportunities

This section describes specific opportunities in the federal information technology market. Two lists of programs are provided.

- Recent Awards
- Future Systems Integration Opportunities

Although neither opportunity list is all-inclusive, both include major programs typical of the federal market.

The list of opportunities becomes smaller after FY 1990 because new programs have not yet been identified or initially approved by the responsible agency. Subsequent issues of this report and the INPUT Procurement Analysis Reports will include additional programs and detailed program information for FY 1990-FY 1994.

A

Present and Future Programs

New information technology programs larger than $1-2 million are listed in at least one of the following federal government documents:

- OMB/GSA Five-Year Plan, which is developed from agency budget requests submitted in compliance with OMB Circular A-11.
- Agency long-range information resource plans developed to meet the reporting requirements of the Paperwork Reduction Reauthorization Act of 1980.
- Agency annual operating budget requests submitted to congressional oversight and appropriations committees based on the OMB A-11 information.
- Commerce Business Daily for specific opportunities for qualifications as a bidder, and invitations to submit a bid in response to an RFP or RFQ

- Five-Year Defense Plan, which is not publicly available, and the supporting documentation of the separate military departments and agencies

- Classified program documentation available only to qualified DoD contractors

Systems integration opportunities may not be specifically identified as such in these documents. Information technology planning documents usually identify mission requirements to be met by specific programs, rather than methods for meeting those requirements. An agency decision to use a systems integration contractor may not be made until a program is well under way and an acquisition plan has been formulated. Over the last several years, however, agencies have shown an increasing tendency to use systems engineering and integration contractors for larger, more complex systems.

All funding proposals are based on cost data of the year submitted with inflation factors dictated by the Administration as part of its fiscal policy, and are subject to revision, reduction, or spread to future years in response to congressional direction. Some additional reductions will be likely in FY 1990 and beyond, due to the tightening of the Department of Defense budget.

B

Recent Awards

AGENCY/PROGRAM	CONTRACTOR	VALUE ($ Million)
Agriculture		
Statistics Automation	Sysorex	16.2
Air Force		
Air Force WWMCCS ADP Modernization (AFWAM)	Honeywell Federal Systems	180
MAC Integrated Procurement System (MAC IPS)	Computer Sciences Corp.	111
Strategic War Planning Systems (SWPS) Baseline	General Dynamics	165
AFLC Technical Integration	Centech	25
Integrated Maintenance Information System (IMIS) Program	McDonnell Douglas General Dynamics	19 15
Cargo Movement Operating System (CMOS)	Evaluation Research, Inc.	15.3
Software Modernization for Air Force Command and Control System (AFC2S)	GTE	400
AFLC Information Systems Engineering, Prototyping, and Development	Centech, LSA, Maxima, SASC, Softech	Less than 12 each
Air Force Equipment Management System (AFEMS)	Centech	17
Army		
Corps of Engineers Automation Plan, Objective 1 (CEAP-1)	Control Data Corporation	365

Computer-Aided Acquisition and Logistics Support (CALS) Phase I	BDM, Xerox, CSC, TRW	2.7-4.6
Navy		
Engineering Data Management Information and Control System (EDMICS)	Advanced Technology	154
Commerce		
Advanced Weather Interactive Information Processing System for the1990s (AWIPS-90)	PRC CSC	4.8 6.0
Automated Nautical Charting System II	Intergraph	10.5
HHS		
SSA Microcomputer Acquisition	Sysorex	31.5
HCFA Data Center	Bendix Field Engineering	56
Support Services for Programmatic Software Modernization	Martin Marietta	43.9
Labor		
Professional Services Contract	CDSI	1.3
Transportation		
Air Route Surveillance Radar (ARSR)	Westinghouse	325
NASA		
KSC Core Electronics Systems	Harris	200
SEC		
Electronic Data Gathering and Retrieval System (EDGAR)	BDM	52
U.S. Postal Service		
Microcomputer Acquisition for the U.S. Postal Service (MAPS)	Sysorex	77

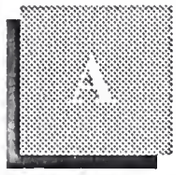
C

Systems Integration Opportunities by Agency

AGENCY/PROGRAM	PAR REFERENCE	RFP SCHEDULE	FY 1989-FY 1994 FUNDING (Est. $ million)
Air Force			
System Engineering Support for NORAD Computer System	V-1-30	FY 1991	15
Air Force Technical Order Management System (AFTOMS)	V-1-53	3Q FY 1990	141.8
Contracting Data Management System—Phase II (CDMS)	V-1-104	3Q FY 1990	52.7
Computer-Aided Acquisition and Logistics Support	V-1-108	-	-
Air Force Equipment Management System (AFEMS)	V-1-109	2Q FY 1989	72.2
Air Force Supercomputer Environment	V-1-118	-	-
Base Level Accounting and Reporting System (BLARS)	V-1-122	1Q FY 1990	17.2
Army			
Army World Wide Military Command and Control System (WWMCCS) Information System (AWIS)	V-2-8	-	-
Small Multi-User Computers (SMC)	V-2-29	3/88	1,200
Reserve Component Automation System (RCAS)	V-2-34	2Q FY 1990	183
Integrated Procurement System (IPS)	V-2-36	4Q FY 1990	39.8
Army Command and Control System (ACCS)	V-2-38	1Q FY 1989	-

Acquisition Information Management (AIM)	V-2-39	1Q FY 1990	-
Military Pay Redesign Joint Services Software	V-2-41	1Q FY 1990	-
Personnel Electronic Records Management System (PERMS)	V-2-42	1/90	50-100
CONUS Freight Management System	V-2-44	2Q FY 1990	207
Navy			
PERSPAY (Personnel and Pay Systems) Consolidated Computer Center Program	V-3-11	2Q FY 1993	26.4
CAD/CAM II	V-3-14	FY 1990	500
Printing Resources Management Information System (PRMIS) II	V-3-34	1Q FY 1989	13.9
Marine Corps			
Automated Production Control System (APCS)	V-3A-9	1Q FY 1989	-
DLA			
Defense Automatic Addressing System (DAAS) ADPE Replacement Program (DARP)	V-4A-4	1Q FY 1990	9.3
DCAA			
DCAA Integrated Information System	V-4C-1	-	-
DCA			
National Emergency Telecommunications System (NETS)	V-4G-3	4Q FY 1989	-
USDA			
Geographic Information System (GIS)	VI-5-30	1Q FY 1990	115
Integrated Systems Acquisition Project (ISAP)	VI-5-34	3Q FY 1990	75

Energy			
Licensing Support System	VI-7-87	1Q FY 1990	200
Interior			
BLM ADPE Modernization Project	VII-9-11	1Q FY 1990	500
USGS Mark II System	VII-9-19	FY 1990	111
Justice			
Standard Industries System	VII-10-19	4Q FY 1989	-
Transportation			
Multiple Contractor Resource Base	VII-11-31	-	-
Marine Safety Information System (MSIS) II	VII-11-32	1Q FY 1991	14.4
Treasury			
Tax Modernization Effort	VII-12-6	FY 1990	298
Check Handling Enhancements & Expert Systems (CHEXS)	VII-12-63	1Q FY 1990	104.8
Integrator Support Contractor	VII-12-64	12/89	500
Service Center Support	VII-12-65	7/90	-
Corporate Files On Line	VII-12-66	9/90	-
Document Processing	VII-12-67	9/90	224.3
GSA			
GSA Systems (GSAS)	VIII-14-5	2Q FY 1990	-
Replacement PBS/IS	VIII-14-23	-	83.1
VA			
DVB Modernization	VIII-16-11	1Q FY 1991	-
Nationwide Office Automation for the VA (NOAVA)	VIII-16-15	4Q FY 1989	298



Appendix: Interview Profiles

A

Federal Agency Respondent Profile

1. Contact Summary

Contacts with agencies were made both by telephone and through on-site visits. On-site interviews were conducted primarily at the department level with officials in the office of Information Resources Management, who are responsible for office systems policy and planning.

The distribution of job classifications among individual agency respondents for the 1987 updated analysis was as follows:

	Policy	Buyers	Users	Total
Respondents	11	1	4	16

2. List of Agencies

Respondents interviewed in 1986 and 1987 represented the agencies listed below, with the number in parentheses indicating the number of different contacts within the agency where more than one contact was made.

- Department of Defense
  - Air Force
  - Army (5)
  - Navy (3)
  - Marine Corps
  - Defense Logistics Agency
  - Defense Mapping Agency
  - Defense Nuclear Agency
  - Office of the Secretary

- Civil Agencies

  - Department of Agriculture (2)
  - Department of Commerce (3)
  - Department of Education
  - Department of Energy (2)
  - Federal Emergency Management Agency
  - General Services Administration
  - Government Printing Office
  - Department of Health and Human Services
  - Department of Housing and Urban Development
  - Department of the Interior (2)
  - Department of Justice
  - National Aeronautics and Space Administration (2)
  - Securities and Exchange Commission
  - Department of State
  - Department of Transportation (3)
  - Department of the Treasury (4)
  - Veterans Administration

B

Vendor Respondent Profile

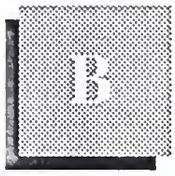
For the 1988 study, INPUT contacted a representative sample of vendors providing systems integration to the federal government. Job classifications among individual vendor respondents included marketing as well as administrative executives.

Contacts with vendor personnel were made by telephone and by mail.

C

Case Study Respondent Profile

Respondents who provided case study profiles on systems integration project included prime contractor representatives.



Appendix: Definitions

The definitions in this appendix include hardware, software, services, and telecommunications categories to accommodate the range of information systems and services programs described in this report.

Alternate service mode terminology employed by the federal government in its procurement process is defined along with INPUT's regular terms of reference, as shown in Exhibit B-1.

The federal government's unique, nontechnical terminology, associated with applications, documentation, budgets, authorization, and the procurement/acquisition process, is included in Appendix C, Glossary of Federal Acronyms.

A

Delivery Modes

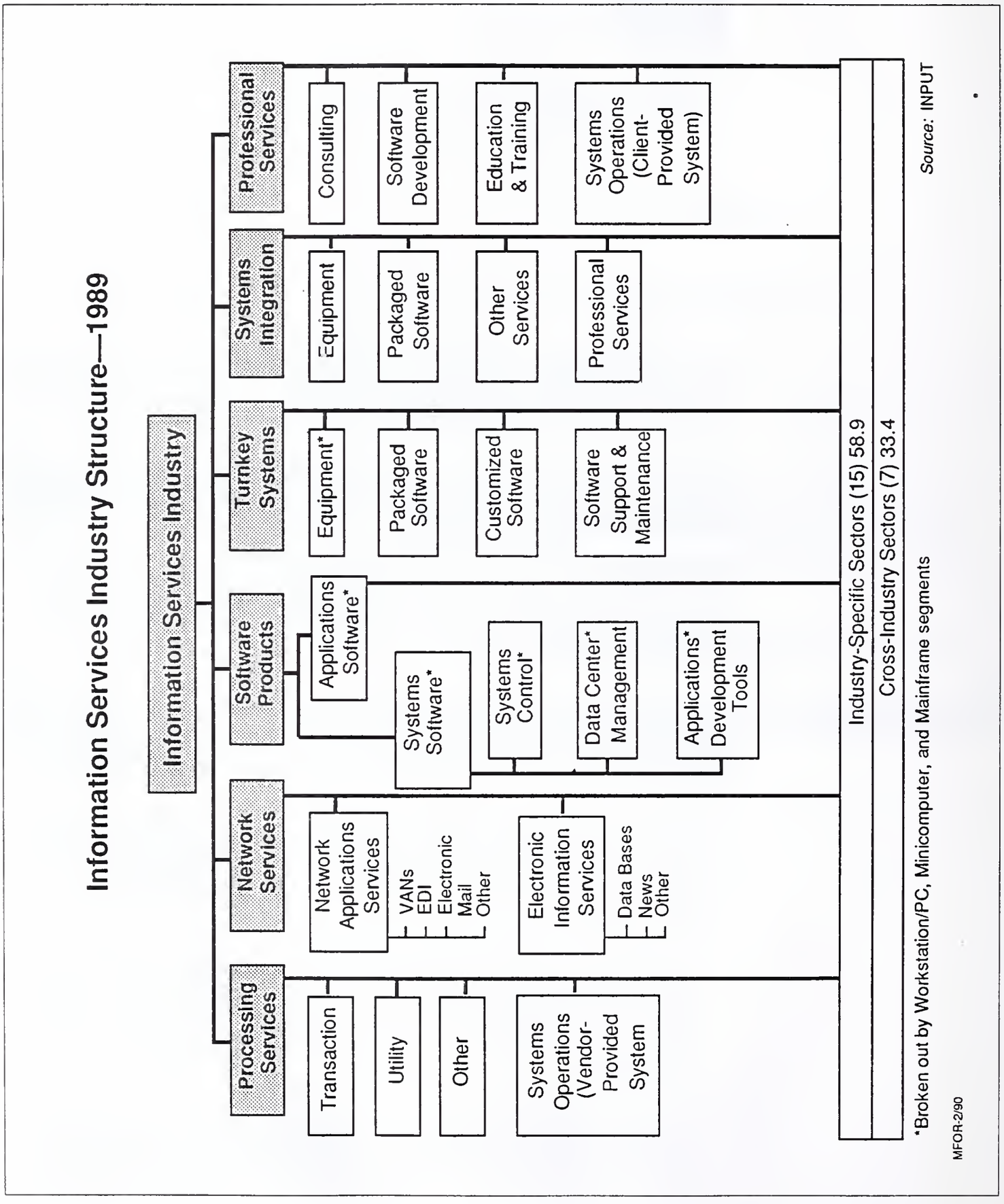
Processing services - This category includes transaction processing, utility processing, other processing services, and processing facilities management.

- Transaction Processing Services - Updates client-owned data files by entry of specific business activity, such as sales order, inventory receipt, cash disbursement, etc. Transactions may be entered in one of these modes:

  - Interactive - Characterized by the interaction of the user with the system, primarily for problem-solving timesharing, but also for data entry and transaction processing; the user is on-line to the program files. Computer response is usually measured in seconds or fractions of a second.

  - Remote Batch - The user hands over control of a job to the vendor's computer, which schedules job execution according to priorities and resource requirements. Computer response is measured in minutes or hours.

EXHIBIT B-1



User Site Hardware Services (USHS) - Those offerings provided by processing services vendors which place programmable hardware at the user's site, rather than at the vendor's data center. Some vendors in the federal government market provide this service under the label of distributed data services. USHS offers the following:

- Access to a communications network
- Access through the network to the RCS vendor's larger computers
- Local management and storage of a data base subset that will serve local terminal users via the connection of a data base processor to the network
- Significant software as part of the service
- Utility Processing - Vendor provides access to basic software tools, enabling the users to develop their own problems solutions such as language compilers assemblers, DBMS, sorts scientific library routines, and other systems software.

Other processing services include the following:

- Batch Services - These include data processing at vendors' sites for user programs and/or data that are physically transported (as opposed to transported electronically by telecommunications media) to and/or from those sites. Data entry and data output services, such as keypunching and computer output microfilm processing, are also included. Batch services include expenditures by users who take their data to a vendor site with a terminal connected to a remote computer for the actual processing. Other services also includes disaster recovery and backup services.
- Systems Operations (Processing) - Also referred to as Resource Management, Facilities Management or COCO (contractor-owned, contractor-operated). Systems control is the management of all or part of a user's data processing functions under a long-term contract of not less than one year. This would include remote computing and batch services. To qualify, the contractor must directly plan, control, operate, and own the facility provided to the user, either onsite, through communications lines, or in a mixed mode.

  Processing services are further differentiated as follows:

  - Cross-industry services involve the processing of applications targeted to specific user departments (e.g., finance, personnel, sales) but cutting across industry lines. Most general-ledger, accounts receivable, payroll, and personnel applications fall into this category.

Cross-industry data base services, for which the vendor supplies the data base and controls access to it (although it may be owned by a third party), are included in this category. General-purpose tools such as financial planning systems, linear regression packages, and other statistical routines are also included. When the application, tool, or data base is designed for specific industry use, however, the services are industry-specific (see below).

- Industry-specific services provide processing for particular functions or problems unique to an industry or industry group. Specialty applications can be used for either business or scientific purposes. Industry-specific data base services, for which the vendor supplies the data base and controls access to it (although it may be owned by a third party), are also included under this category. Examples of industry-specialty applications are seismic data processing, numerically controlled machine tool software development, and demand deposit accounting.

Network services include a wide variety of network-based functions and operations. The common thread is that more of these functions could be performed without network involvement. Network services is divided into two segments: value-added networks (enhanced services) and network applications (electronic information systems).

- Value-Added Networks (VANs) - VANs typically involve common carrier network transmission facilities augmented by computerized switches. These networks have become associated with packet-switching technology because the public VANs that have received the most attention (e.g., Telenet and TYMNET) employ packet-switching techniques. But other added data service features such as store-and-forward message switching, terminal interfacing, error detection and correction, and host computer interfacing are of equal importance.

- Network applications include Electronic Data Interchange (EDI), the application-to-application electronic communications between organizations, based on established business document standards, and electronic mail.

Software products - This category comprises user purchases of applications and systems software packages for in-house computer systems. Included are expenditures for lease and purchase, and for work performed by the vendor to implement or maintain the package at the user's sites. Expenditures for work performed by organizations other than the package vendor are counted in the category of professional services. Fees for work related to education, consulting, and/or custom modification of software products are counted as professional services, provided such fees are charged separately from the price of the software product itself. Software products have several subcategories, as indicated below and shown in detail in Exhibit B-2.

EXHIBIT B-2

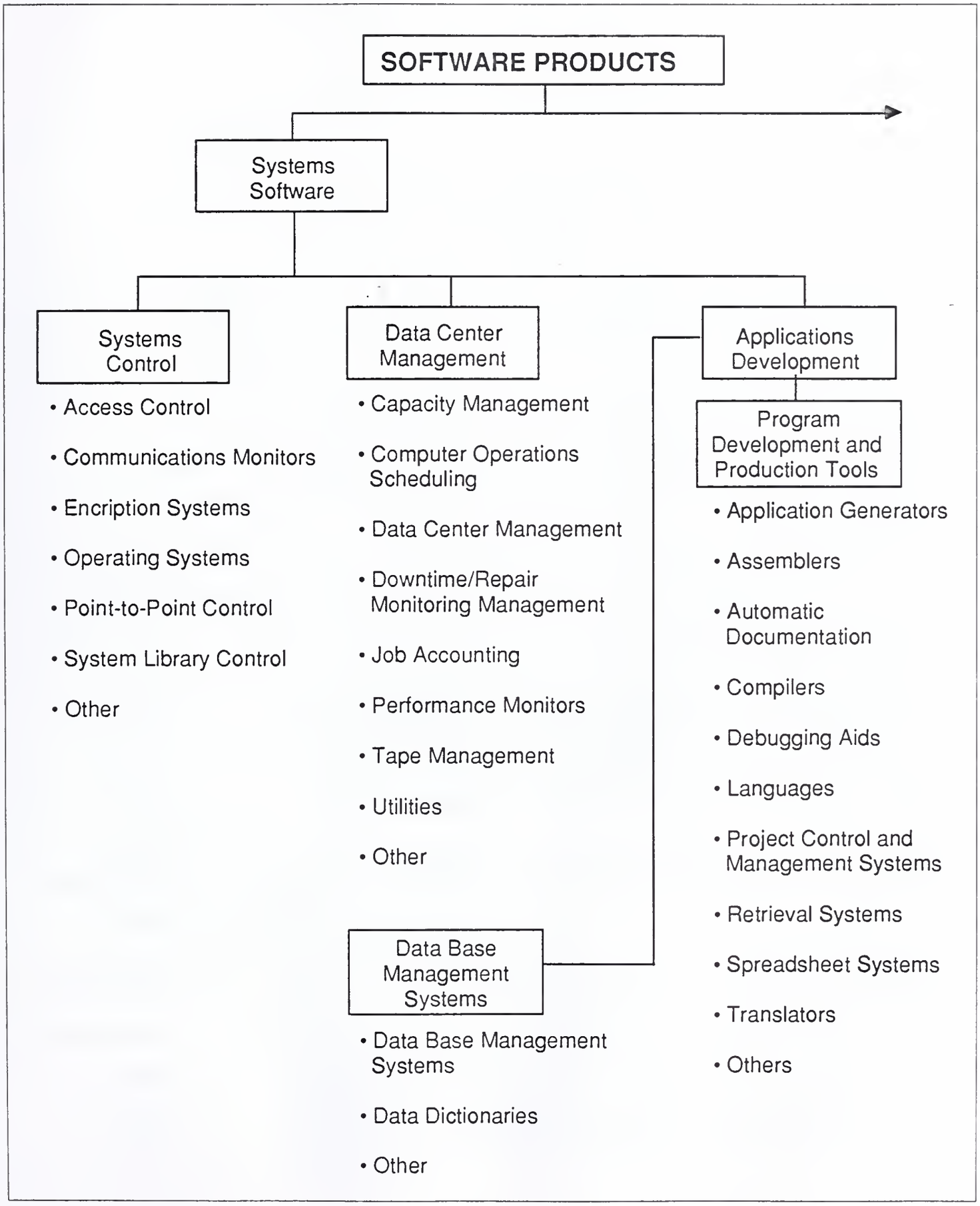
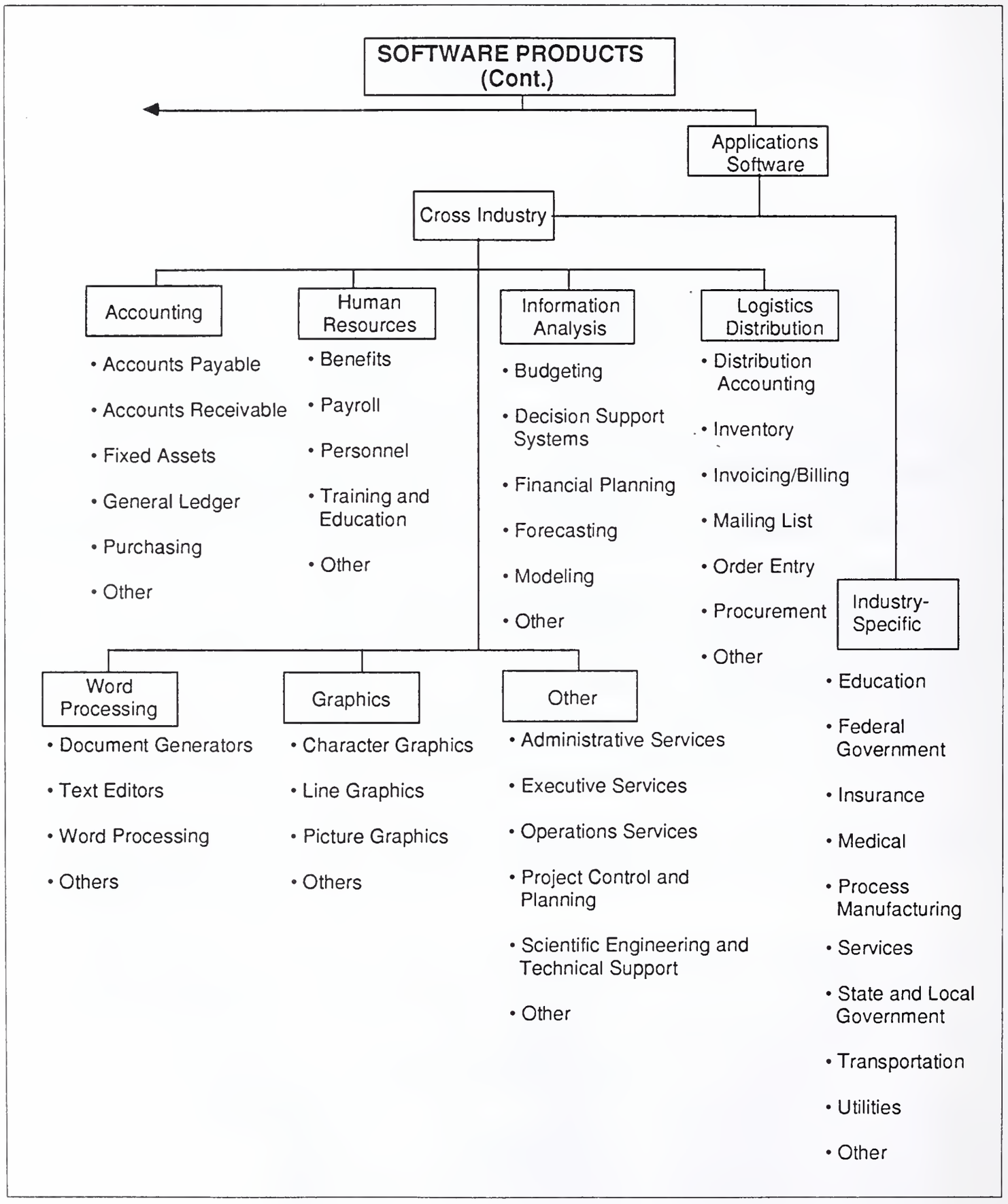


EXHIBIT B-2 (Cont.)



- Applications Products - Software that performs functions directly related to solving user's business or organizational need. The products can be any of the following:

  - Cross-Industry Products - Used in multiple-industry applications as well as the federal government sector. Examples are payroll, inventory control, and financial planning.

  - Industry-Specific Products - Used in a specific industry sector, such as banking and finance, transportation, or discrete manufacturing. Examples are demand deposit accounting, airline scheduling, and material resource planning.

- Systems Software Products - Software enabling the computer/communications system to perform basic functions. These products include the following:

  - System Control Products - Function during applications program execution to manage the computer system resources. Examples include operating systems, communications monitors, emulators, spoolers, network control, library control, windowing, and access control.

  - Data Center Management Products - Used by operations personnel to manage the computer systems resources and personnel more effectively. Examples include performance measurement, job accounting, computer operations scheduling, utilities, and capacity management.

  - Applications Development Products - Used to prepare applications for execution by assisting in designing, programming, testing, and related functions. Examples include traditional programming languages, 4GLs, sorts, productivity aids, assemblers, compilers, data dictionaries, data base management systems, report writers, project control, and CASE systems.

Professional Services - This category includes consulting, education and training, software development, and systems operations, as defined below:

- Software Development - Develops a software system on a custom basis. It includes one or more of the following: user requirements definition, system design, contract, programming, and/or documentation.

- Education and Training - Products and/or services related to information systems and services for the user, including computer-aided instruction (CAI), computer-based education (CBE), and vendor instruction of user personnel in operations, programming, and maintenance

- Consulting Services - Information systems and/or services management consulting, project assistance (technical and/or management), feasibility analyses, and cost-effectiveness trade-off studies

- Systems Operations (Professional Services) - This is a counterpart to systems operations (professional services) except the computing equipment is owned or leased by the client, not by the vendor. The vendor provides the staff to operate, maintain, and manage the client's facility.

Turnkey Systems - A turnkey system is an integration of systems and applications software with CPU hardware and peripherals, packaged as a single application (or set of applications) solution. The value added by the vendor is primarily in the software and support. Most CAD/CAM systems and many small-business systems are turnkey systems. This does not include specialized hardware systems such as word processors, cash registers, or process control systems; nor does it include Embedded Computer Resources for military applications. They may be either custom or packaged systems.

- Hardware vendors that combine software with their own general-purpose hardware are not classified by INPUT as turnkey vendors. Their software revenues are included in the appropriate software category.

- Turnkey systems revenue is divided into two categories:

  - Industry-specific systems - Systems serving a specific function for a given industry sector such as automobile dealer parts inventory, CAD/CAM systems, or discrete manufacturing control systems

  - Cross-industry systems - Systems providing a specific function applicable to a wide range of industry sectors, such as financial planning systems, payroll systems, or personnel management systems

- Revenue includes hardware, software, and support functions.

Systems Integration - (SI) delivery of large, complex multidisciplinary, multivendor systems, incorporating some or all of these categories: systems design, programming, integration, equipment, packaged software, communication networks, installation, education and training, and SI related professional services and acceptance. Systems integration contracts typically take more than a year to complete, and involve a prime contractor assuming risk and accepting full responsibility.

B

Hardware/Hardware Systems

Hardware - Includes all computer and telecommunications equipment that can be separately acquired with or without installation by the vendor and not acquired as part of an integrated system

- Peripherals - Includes all input, output, communications, and storage devices (other than main memory) that can be connected locally to the main processor, and generally cannot be included in other categories such as terminals

- Input Devices - Includes keyboards, numeric pads, card readers, light pens and track balls, tape readers, position and motion sensors, and analog-to-digital converters

- Output Devices - Includes printers, CRTs, projection television screens, micrographics processors, digital graphics, and plotters

- Communication Devices - Includes modem, encryption equipment, special interfaces, and error control

- Storage Devices - Includes magnetic tape (reel, cartridge, and cassette), floppy and hard disks, solid state (integrated circuits), and bubble and optical memories

Terminals - Three types of terminals are described below:

- User Programmable - Also called intelligent terminals, including the following:

  - Single-station or standalone
  - Multistation, shared processor
  - Teleprinter
  - Remote batch

- User Nonprogrammable

  - Single-station
  - Multistation, shared processor
  - Teleprinter

- Limited Function - Originally developed for specific needs, such as point-of-sale (POS), inventory data collection, controlled access, and other applications

Hardware Systems - Includes all processors from microcomputers to supercomputers. Hardware systems may require type- or model-unique operating software to be functional, but this category excludes

applications software and peripheral devices, other than main memory and processors or CPUs not provided as part of an integrated (turnkey) system.

- Microcomputer - Combines all of the CPU, memory, and peripheral functions of an 8-, 16-, or 32-bit computer on a chip in various forms including:
  - Integrated circuit package
  - Plug-in boards with increased memory and peripheral circuits
  - Console including keyboard and interfacing connectors
  - Personal computer with at least one external storage device directly addressable by the CPU
  - An embedded computer which may take a number of shapes or configurations
- Midsize Computer - Typically a 32- or 64-bit computer with extensive applications software and a number of peripherals in stand-alone or multiple-CPU configurations for business (administrative, personnel, and logistics) applications; also called a general purpose computer. All Intel 80386, Motorola 68000-based systems, and large multiuser systems are included. Specific systems in this category are as follows: IBM 93XX systems; all Digital VAX series systems; and such common UNIX-based systems as those from Apollo and Sun are also included. Most large, shared-logic, integrated office systems—such as those from Wang, Hewlett-Packard, and Honeywell Bull—would also be considered midsized systems. However, this category does not include microcomputers (standalone, or shared), embedded systems, or CAD/CAM systems.
- Large Computer - Presently centered on storage controllers, but likely to become bus-oriented and to consist of multiple processors or parallel processor. Intended for structured mathematical and signal processing and typically used with general purpose, Von Neumann-type processors for system control. This term usually refers to traditional mainframes and supercomputers.
- Supercomputer - High-powered processors with numerical processing throughput that is significantly greater than the fastest general purpose computers, with capacities in the 100-500 million floating point operations per second (MFLOPS) range. Newer supercomputers, with burst modes over 500 MFLOPS, main storage size up to 10 million words, and on-line storage in the one-to-four gigabyte class, are labeled Class V to Class VII in agency long-range plans. Supercomputers fit in one of two categories:

- Real Time - Generally used for signal processing in military applications

- Non-Real Time - For scientific use in one of three configurations:

  - Parallel processors
  - Pipeline processor
  - Vector processor

- Supercomputer - Term applied to micro, mini, and large mainframe computers with performance substantially higher than attainable by Von Neumann architectures

- Embedded Computer - Dedicated computer system designed and implemented as an integral part of a weapon, weapon system, or platform; critical to a military or intelligence mission such as command and control, cryptological activities, or intelligence activities. Characterized by military specifications (MIL SPEC) appearance and operation, limited but reprogrammable applications software, and permanent or semipermanent interfaces. These systems may vary in capacity from microcomputers to parallel processor computer systems.

C

Telecommunications

Networks - Electronic interconnection between sites or locations; may incorporate links between central computer sites and remote locations and switching and/or regional data processing nodes. Network services typically are provided on a leased basis by a vendor to move data, voice, video, or textual information between locations. Networks can be categorized in several different ways:

- Common Carrier Network - A public access network, such as AT&T, consisting of conventional, voice-grade circuits and regular switching facilities reached by dial-up calling with leased or user-owned modems for transfer rates between 150 and 1200 baud

- Value-Added Network (VAN) - (See listing under Section B, Delivery Modes.)

- Local-Area Network (LAN) - Limited-access network between computing resources in a relatively small (but not contiguous) area, such as a building, complex of buildings, or buildings distributed within a metropolitan area. LANs use one of two signaling methods:

  - Baseband - Signaling using digital waveforms on a single-frequency band, usually at voice frequencies and bandwidth, and limited to a single sender at any given moment. When used for local-area networks, a baseband is typically used with TDM to permit multiple access.

- Broadband - Transmission facilities that use frequencies greater than normal voice-grade, supported in local-area networks with RF modems and AC signaling. Also known as wideband. Employs multiplexing techniques that increase carrier frequency between terminals to provide various services:

  · Multiple (simultaneous) channels via FDM (Frequency Division Multiplexing)

  · Multiple (time-sequenced) channels via TDM (Time Division Multiplexing)

  · High-speed data transfer rate via parallel mode at rates of up to 96,000 baud (or higher, depending on media)

  · Wide-Area Network (WAN) - Limited access network between computing resources in buildings, complexes of buildings, or buildings within a large metropolitan or wide geographical area. WANs use baseband or broadband signaling methods.

- Transmission Facilities - Includes wire, carrier, coaxial cable, microwave, optical fiber, satellites, cellular radio, and marine cable operating in one of two modes depending on the vendor and the distribution of the network

- Mode - may be either analog or digital:

  · Analog - Transmission or signal with continuous-waveform representation, typified by AT&T's predominantly voice-grade DDD network and most telephone operating company distribution systems

  · Digital - Transmission or signal using discontinuous, discrete quantities to represent data, record, video, or text in binary form

• Media - may be any of the following:

- Wire - Varies from earlier, single-line, teletype networks, to two-wire standard telephone (twisted pair), to four-wire, full-duplex, balanced lines

- Carrier - A wave, pulse train, or other signal suitable for modulation by an information-bearing signal to be transmitted over a communications system, used in multiplexing applications to increase network capacity

- Coaxial Cable - A cable used in HF (high-frequency) and VHF (very high frequency), single-frequency, or carrier-based systems, which

requires frequent reamplification (repeaters) to carry the signal any distance

- Microwave - UHF (ultra-high-frequency) multichannel, point-to-point, repeated radio transmission, also capable of wide frequency channels

- Optical Fiber - Local signal distribution systems employed in limited areas, using light-transmitting glass fibers and TDM for multichannel applications

- Communications Satellites - Synchronous, earth-orbiting systems that provide point-to-point, two-way service over significant distances without intermediate amplification (repeaters), but requiring suitable groundstation facilities expand markets for those technologies, and leverage existing and new product lines. In effect, they are focused on using their typically limited professional services resources to maximize the return on their core business products. This is true in most cases for federal market vendors as well. Most hardware firms prefer to apply their own core business products, and cannot avoid the use of the hardware of other manufacturers. This policy may limit their ability to respond to all systems integration asynchronous or synchronous, half or full duplex.

D

General Definitions

ASCII - American National Standard Code for Information Interchange—Eight-bit code with seven data bits and one parity bit

Asynchronous - Communications operation (such as transmission) without continuous timing signals. Synchronization is accomplished by appending signal elements to the data.

Bandwidth - Range of transmission frequencies that can be carried on a communications path; used as a measure of capacity.

Baud - Number of signal events (discrete conditions) per second. Typically used to measure modem or terminal transmission speed.

Byte - Usually equivalent to the storage required for one alphanumeric character (i.e., one letter or number)

CBX - Computerized Branch Exchange—A PABX based on a computer system, implying programmability and usually voice and data capabilities

Central Processing Unit (CPU) - The arithmetic and control portion of a computer; i.e., the circuits controlling the interpretation and execution of computer instructions.

Centrex - Central office telephone services that permit local circuit switching without installation of customer premises equipment. Could be described as shared PBX service.

Circuit Switching - A process that, usually on demand, connects two or more network stations, and permits exclusive circuit use until the connection is released; typical of the voice telephone network, where a circuit is established between the caller and the called party.

CO - Central Office—Local telco site for one or more exchanges

CODEC - Coder/decoder, equivalent to modem for digital devices

Constant Dollars - Growth forecasts in constant dollars make no allowance for inflation or recession. Dollar value based on the year of the forecast unless otherwise indicated.

Computer System - The combination of computing resources required to perform the designed functions. May include one or more CPUs, machine room peripherals, storage systems, and/or applications software.

CPE - Customer Premises Equipment—DCE or DTE located at a customer site rather than at a carrier site such as the local telephone company CO. May include switchboards, PBX, data terminals, and telephone answering devices.

CSMA/CD - Carrier Sense Multiple Access/Collision Detect—Contention protocol used in local-area networks, typically with a multipoint configuration

Current Dollars - Estimates or values expressed in current-year dollars which, for forecasts, would include an allowance for inflation

Data Encryption Standard (DES) - Fifty-six-bit key, one-way encryption algorithm adopted by NIST in 1977, implemented through hardware ("S-boxes") or software. Designed by IBM with NSA guidance.

Datagram - A self-contained packet of information that does not depend on the contents of preceding or following packets and has a finite length

DCA - IBM's Document Content Architecture—Protocols for specifying document (text) format which are consistent across a variety of hardware and software systems within IBM's DISOSS

DCE - Data Circuit-terminating Equipment—Interface hardware that couples DTE to a transmission circuit or channel by providing functions to establish, maintain, and terminate a connection, including signal conversion and coding

DDCMP - Digital Data Communications Message Protocol —Data link protocol used in Digital Equipment Company's DECNET

DECNET - Digital Equipment Company's network architecture

Dedicated Circuit - A permanently established network connection between two or more stations; contrast with switched circuit

DEMS - Digital Electronic Message Service—Nationwide common carrier digital networks which provide high-speed, end-to-end, two-way transmission of digitally encoded information using the 10.6 GHz band

DIA - IBM's Document Interchange Architecture - Protocols for transfer of documents (text) between different hardware and software systems within IBM's DISOSS

DISOSS - IBM's DIStributed Office Support System - Office automation environment, based on DCA and DIA, which permits document (text) transfer between different hardware and software systems without requiring subsequent format or content revision

Distributed Data Processing - The development of programmable intelligence in order to perform a data processing function where it can be accomplished most effectively through computers and terminals arranged in a telecommunications network adapted to the user's needs

DTE - Data Terminal Equipment—Hardware which is a data source, link, or both, such as video display terminals that convert user information into data transmission, and reconvert data signals into user information

EBCDIC - Extended Binary Coded Decimal Interchange Code —Eight-bit code typically used in IBM mainframe environments

EFT - Electronic funds transfer

Encryption - Electric, code-based conversion of transmitted data to provide security and/or privacy of data between authorized access points

End User - One who is using a product or service to accomplish his or her own functions. The end user may buy a system from the hardware supplier(s) and do his or her own programming, interfacing, and installation. Alternately, the end user may buy a turnkey system from a systems house or hardware integrator, or may buy a service from an in-house department or external vendor.

Engineering Change Notice (ECN) - Product improvements after production

Engineering Change Order (ECO) - The follow-up to ECNs, including parts and a bill of materials to effect the change in the hardware

Equipment Operators - Individuals operating computer control consoles and/or peripheral equipment (BLS definition)

Ethernet - Local-area network developed by Xerox PARC using base-band signaling, CSMA/CD protocol, and coaxial cable to achieve a 10 mbps data rate

Facsimile - Transmission and reception of graphic data, usually fixed images of documents, through scanning and conversion of a picture signal

FDM - Frequency Division Multiplexing—A multiplexing method that permits multiple access by assigning different frequencies of the available bandwidth to different channels

FEP - Front-End Processor—Communications concentrator such as the IBM 3725 or COMTEN 3690 used to interface communications lines to host computers

Field Engineer (FE) - Field engineer, customer engineer, serviceperson, and maintenance person are used interchangeably and refer to the individual who responds to a user's service call to repair a device or system.

Full-Duplex - Bi-directional communications, with simultaneous, two-way transmission

General Purpose Computer System - A computer designed to handle a wide variety of problems. Includes machine room peripherals, systems software, and small business systems.

Half-Duplex - Bi-directional communications, but only in one direction at a time

Hardware Integrator - Develops system interface electronics and controllers for the CPU, sensors, peripherals, and all other ancillary hardware components. The hardware integrator also may develop control system software in addition to installing the entire system at the end-user site.

HDLC - High-level Data Link Control

Hertz- Number of signal oscillations (cycles) per second, abbreviated Hz

IBM Token Ring - IBM's local area network using baseband signalling and operating at 4 mbps on twisted-pair copper wire. Actually a combination of star and ring topologies—IEEE 802.5-compatible.

IDN - Integrated Digital Network—Digital switching and transmission; part of the evolution to ISDN.

Independent Suppliers - Suppliers of machine room peripherals, though usually not suppliers of general purpose computer systems

Information Processing - Data processing as a whole, including use of business and scientific computers

Installed Base - Cumulative number or value (cost when new) of computers in use

Interconnection - Physical linkage between devices on a network

Interoperability - The capability to operate with other devices on a network. Different from interconnection, which merely guarantees a physical network interface.

ISDN - Integrated Services Digital Network—Completely digital, integrated voice and nonvoice public network service. Not clearly defined through any existing standards, although FCC and other federal agencies are developing CCITT recommendations.

Keypunch Operators - Individuals operating keypunch machines (similar to electric typewriters) to transcribe data from source materials onto punch cards

Lease Line - Permanent connection between two network stations. Also known as dedicated or non-switched line.

Machine Repairers - Individuals who install and periodically service computer systems

Machine Room Peripherals - Peripheral equipment generally located close to the central processing unit

Mainframe - The central processing unit (CPU or units in a parallel processor) of a computer that interprets and executes computer (software) instructions of 32 bits or more

MAP - Manufacturing Automation Protocol - Seven-layer communications standard for factory environments promoted by General Motors/ EDS. Adopts IEEE 802.2 and IEEE 802.4 standards plus OSI protocols for other layers of the architecture.

Mean Time to Repair - The mean of elapsed times from the arrival of the field engineer on the user's site to the time when the device is repaired and returned to user service

Mean Time to Respond - The mean of elapsed times from the user call for services and the arrival of the field engineer on the user's site

Message - A communication intended to be read by a person. The quality of the received document need not be high, only readable. Graphic materials are not included.

MMFS - Manufacturing Messaging Format Standard—Application-level protocol included within MAP

Modem - A device that encodes information into electronically transmittable form (MOdulator) and restores it to original analog form (DEModulator)

NCP - Network Control Program—Software used in IBM 3705/3725 FEPs for control of SNA networks.

Node - Connection point of three or more independent transmission points which may provide switching or data collection

Off-Line - Pertaining to equipment or devices that can function without direct control of the central processing unit

On-Line - Pertaining to equipment or devices under direct control of the central processing unit

OSI - ISO reference model for Open Systems Interconnection—Seven-layer architecture for application, presentation, session, transport, network, data link, and physical services and equipment

OSI Application Layer - Layer 7, providing end-user applications services for data processing

OSI Data Link Layer - Layer 2, providing transmission protocols, including frame management, link flow control, and link initiation/ release

OSI Network Layer - Layer 3, providing call establishment and clearing control through the network nodes

OSI Physical Layer - Layer 1, providing the mechanical, electrical, functional, and procedural characteristics to establish, maintain, and release physical connections to the network

OSI Presentation Layer - Layer 6, providing data formats and information such as data translation, data encoding/decoding, and command translation

OSI Session Layer - Layer 5, establishes, maintains, and terminates logical connections for the transfer of data between processes

OSI Transport Layer - Layer 4, providing end-to-end terminal control signals such as acknowledgements

Overseas - Not within the geographical limits of the continental United States, Alaska, Hawaii, and U.S. possessions

PABX - Private Automated Branch Exchange—Hardware that provides automatic (electro-mechanical or electronic) local circuit switching on a customer's premises

PAD - Packet Assembler-Disassembler—A device that enables DTE not equipped for packet switching operation to operate on a packet switched network

PBX - Private Branch Exchange—Hardware that provides local circuit switching on the customer premise

PCM - Pulse-Code Modulation—Modulation involving conversion of a waveform from analog to digital form through coding

PDN - Public Data Network—A network established and operated by a recognized private operating agency, a telecommunications administration, or other agency for the specific purpose of providing data transmission services to the public

Peripherals - Any unit of input/output equipment in a computer system, exclusive of the central processing unit

PPM - Pulse Position Modulation

Private Network - A network established and operated for one user or user organization

Programmers - Persons mainly involved in designing, writing, and testing computer software programs

Protocols - The rules for communication system operation that must be followed if communication is to be effected. Protocols may govern portions of a network or service. In digital networks, protocols are digitally encoded as instructions to computerized equipment.

Public Network - A network established and operated for more than one user with shared access, usually available on a subscription basis. See related international definition of PDN.

Scientific Computer System - A computer system designed to process structured mathematics (such as Fast Fourier Transforms), and complex, highly redundant information (such as seismic data, sonar data, and radar), with large, on-line memories and very high-capacity output

SDLC - Synchronous Data Link Control—IBM's data link control for SNA. Supports a subset of HDLC modes.

SDN - Software-Defined Network

Security - Physical, electrical, and computer (digital) coding procedures to protect the contents of computer files and data transmission from inadvertent or unauthorized disclosure to meet the requirements of the Privacy Act and national classified information regulations

Service Delivery Point - The location of the physical interface between a network and customer/user equipment

Simplex - Unidirectional communications

Smart Box - A device for adapting existing DTE to new network standards such as OSI. Includes PADs and protocol convertors, for example.

SNA - Systems Network Architecture—Seven-layer communications architecture designed by IBM. Layers correspond roughly but not exactly to OSI model.

Software - Computer programs

Supplies - Includes materials associated with the use of operations of computer systems, such as printer paper, keypunch card, disk packs, and tapes

Switched Circuit - Temporary connection between two network stations established through dial-up procedures

Synchronous - Communications operation with separate, continuous clocking at both sending and receiving stations

Systems Analyst - Individual who analyzes problems to be converted to a programmable form for application to computer systems

Systems House - Vendor that acquires, assembles, and integrates hardware and software into a total system to satisfy the data processing requirements of an end user. The vendor also may develop systems software products for license to end users. The systems house vendor does not manufacture mainframes.

Systems Integrator - Systems house vendor that develops systems interface electronics, applications software, and controllers for the CPU, peripherals, and ancillary subsystems which may have been provided by a contractor or the government (GFE). This vendor may either supervise or perform the installation and testing of the completed system.

T1 - Bell System designation for 1.544 mbps carrier capable of handling 24 PCM voice channels

TDM - Time Division Multiplexing—A multiplexing method that interleaves multiple transmissions on a single circuit by assigning a different time slot to each channel.

Token Passing - Local-area network protocol which allows a station to transmit only when it has the "token," an empty slot on the carrier

TOP - Technical Office Protocol —Protocol developed by Boeing Computer Services to support administrative and office operations as complementary functions to factory automation implemented under MAP

Turnkey System - System composed of hardware and software integrated into a total system designed to fulfill completely the processing requirements of a single application

Twisted-Pair Cable - Communications cabling consisting of pairs of single-strand metallic electrical conductors, such as copper wires, typically used in building telephone wiring and some LANs

Verification and Validation - Process for examining and testing applications and special systems software to verify that it operates on the target CPU and performs all of the functions specified by the user

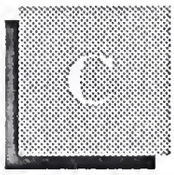
Voice-Grade - Circuit or signal in the 300-3300 Hz bandwidth typical of the public telephone system, nominally a 4 Khz user

VTAM - Virtual Telecommunications Access Method—Host-resident communications software for SNA networks

E

Other Considerations

When questions arise as to the proper place to count certain user expenditures, INPUT addresses the questions from the user viewpoint. Expenditures are then categorized according to the users' perception of the purchase.



Appendix: Glossary of Acronyms

The federal government's procurement language uses a combination of acronyms, phrases, and words that is complicated by different agency definitions and interpretations. The government also uses terms of accounting, business, economics, engineering, and law with new applications and technology.

Acronyms and contract terms that INPUT encountered most often in program documentation and interviews for this report are listed below, but this glossary should not be considered all-inclusive. Federal procurement regulations (DAR, FPR, FAR, FIRMR, FPMR) and contract terms listed in RFIs, RFPs, and RFQs provide applicable terms and definitions.

Federal agency acronyms have been included if they are used in this report.

A

Federal Acronyms

AAS	Automatic Addressing System.
AATMS	Advanced Air Traffic Management System.
ACO	Administrative Contracting Offices (DCAS).
ACS	Advanced Communications Satellite (formerly NASA 30/20 GHz Satellite Program).
ACT-1	Advanced Computer Techniques (Air Force).
Ada	DoD High-Order Language.
ADA	Airborne Data Acquisition.
ADL	Authorized Data List.
ADS	Automatic Digital Switches (DCS).
AFA	Air Force Association.
AFCEA	Armed Forces Communications Electronics Association.
AGE	Aerospace Ground Equipment.
AIP	Array Information Processing.
AIS	Automated Information System.
AMPE	Automated Message Processing Equipment.

AMPS	Automated Message Processing System.
AMSL	Acquisition Management Systems List.
ANG	Army National Guard.
AP(P)	Advance Procurement Plan.
Appropriation	Congressionally approved funding for authorized programs and activities of the Executive Branch.
APR	Agency Procurement Request.
ARPANET	DARPA network of scientific computers.
ASP	Aggregated Switch Procurement.
ATLAS	Abbreviated Test Language for All Systems (for ATE-Automated Test Equipment).
Authorization	In the legislative process programs, staffing and other routine activities must be approved by Oversight Committees before the Appropriations Committee will approve the money from the budget.
AUSA	Association of the U.S. Army.
AUTODIN	AUTOmatic DIgital Network of the Defense Communications System.
AUTOSEVOCOM	AUTOmatic SEcure VOice Communications Network
AUTOVON	AUTOmatic VOice Network of the Defense Communications System.
BA	Basic Agreement.
BAFO	Best And Final Offer.
Baselevel	Procurement, purchasing, and contracting at the military installation level.
BCA	Board of Contract Appeals.
Benchmark	Method of evaluating ability of a candidate computer system to meet user requirements.
Bid protest	Objection (in writing, before or after contract award) to some aspect of a solicitation by a valid bidder.
BML	Bidders Mailing List—Qualified vendor information filed annually with federal agencies to receive automatically RFPs and RFQs in areas of claimed competence.
BOA	Basic Ordering Agreement.
B&P	Bid and Proposal—Vendor activities in response to solicitation/specific overhead allowance.
BPA	Blanked Purchase Agreement.
Budget	Federal Budget, proposed by the President and subject to Congressional review.
C^2	Command and Control.
C^3	Command, Control, and Communications.
C^4	Command, Control, Communications, and Computers.
C^3I	Command, Control, Communications, and Intelligence.
CAB	Contract Adjustment Board or Contract Appeals Board.
CADE	Computer-Aided Design and Engineering.

CADS	Computer-Assisted Display Systems.
CAIS	Computer-Assisted Instruction System.
CALS	Computer-Aided Automated Logistics System.
CAPS	Command Automation Procurement Systems.
CAS	Contract Administration Services or Cost Accounting Standards.
CASB	Cost Accounting Standards Board.
CASP	Computer-Assisted Search Planning.
CBD	*Commerce Business Daily*—U.S. Department of Commerce publication listing government contract opportunities and awards.
CBO	Congressional Budget Office.
CCEP	Commercial Comsec Endorsement Program.
CCDR	Contractor Cost Data Reporting.
CCN	Contract Change Notice.
CCPDS	Command Center Processing and Display Systems.
CCPO	Central Civilian Personnel Office.
CCTC	Command and Control Technical Center (JCS).
CDR	Critical Design Review.
CDRL	Contractor Data Requirement List.
CFE	Contractor-Furnished Equipment.
CFR	Code of Federal Regulations.
CICA	Competition in Contracting Act.
CIG	Computerized Interactive Graphics.
CIR	Cost Information Reports.
CM	Configuration Management.
CMI	Computer-Managed Instruction.
CNI	Communications, Navigation, and Identification.
CO	Contracting Office, Contract Offices, or Change Order.
COC	Certificate of Competency (administered by the Small Business Administration).
COCO	Contractor-Owned, Contractor-Operated.
CODSIA	COuncil of Defense and Space Industry Associations.
COMSTAT	Communications Satellite Corporation.
CONUS	CONtinental U. S.
COP	Capability Objective Package.
COTR	Contracting Officer's Technical Representative.
CP	Communications Processor.
CPAF	Cost-Plus-Award-Fee contract.
CPFF	Cost-Plus-Fixed-Fee contract.
CPIF	Cost-Plus-Incentive-Fee contract.
CPR	Cost Performance Reviews.
CPSR	Contractor Procurement System Review.
CR	Cost Reimbursement (Cost Plus contract).
CSA	Combat or Computer Systems Architecture.
C/SCSC	Cost/Schedule Control System Criteria (also called "C-Spec").
CWAS	Contractor Weighted Average Share in Cost Risk.

DAL	Data Accession List.
DAR	Defense Acquisition Regulations.
DARPA	Defense Advanced Research Projects Agency.
DAS	Data Acquisition System.
DBHS	Data Base Handling System.
DCA	Defense Communications Agency.
DCAA	Defense Contract Audit Agency.
DCAS	Defense Contract Administration Services.
DCASR	DCAS Region.
DCC	Digital Control Computer.
DCP	Development Concept Paper (DoD).
DCS	Defense Communications System.
DCTN	Defense Commercial Telecommunications Network.
DDA	Dynamic Demand Assessment (Delta Modulation).
DDC	Defense Documentation Center.
DDL	Digital Data Link—A segment of a communications network used for digital data transmission.
DDN	Defense Data Network.
DDS	Dynamic Diagnostics System.
DECCO	DEfense Commercial Communications Office.
DECEO	DEfense Communications Engineering Office.
D&F	Determination and Findings—Required documentation for approval of a negotiated procurement.
DIA	Defense Intelligence Agency.
DIF	Document Interchange Format—Navy-sponsored word processing standard.
DHHS	Department of Health and Human Services.
DIDS	Defense Integrated Data Systems
DISC	Defense Industrial Supply Center.
DLA	Defense Logistics Agency.
DMA	Defense Mapping Agency.
DNA	Defense Nuclear Agency.
DO	Delivery Order.
DOA	Department of Agriculture (also USDA).
DOC	Department of Commerce.
DOE	Department of Energy.
DOI	Department of Interior.
DOJ	Department of Justice.
DOS	Department of State.
DOT	Department of Transportation.
DPA	Delegation of Procurement Authority (granted by GSA under FPRs).
DPC	Defense Procurement Circular.
DQ	Definite Quantity Contract.
DQ/PL	Definite Quantity Price List Contract.
DR	Deficiency Report.
DSCS	Defense Satellite Communication System.
DSN	Defense Switched Network.
DSP	Defense Support Program (WWMCCS).
DSS	Defense Supply Service.

DTC	Design-To-Cost.
ECP	Engineering Change Proposal.
ED	Department of Education.
EEP	Equal Employment Opportunity.
EMC	Electro-Magnetic Compatibility.
EMCS	Energy Monitoring and Control System.
EO	Executive Order - Order issued by the President.
EOQ	Economic Ordering Quantity.
EPA	Economic Price Adjustment.
EPA	Environmental Protection Agency.
EPMR	Estimated Peak Monthly Requirement.
EPS	Emergency Procurement Service (GSA) or Emergency Power System.
EUC	End User Computing, especially in DoD.
FA	Formal Advertising.
FAC	FAcility Contract.
FAR	Federal Acquisition Regulations.
FCA	Functional Configuration Audit.
FCC	Federal Communications Commission.
FCDC	Federal Contract Data Center.
FCRC	Federal Contract Research Center.
FDPC	Federal Data Processing Center.
FEDSIM	Federal (Computer) SIMulation Center (GSA).
FEMA	Federal Emergency Management Agency.
FFP	Firm Fixed-Price contract (also Lump Sum Contract).
FIPS	NIST Federal Information Processing Standard.
FIPS PUBS	FIPS PUBlications.
FIRMR	Federal Information Resource Management Regulations.
FMS	Foreign Military Sales.
FOC	Final Operating Capability.
FOIA	Freedom of Information Act.
FP	Fixed-Price contract.
FP-L/H	Fixed-Price—Labor/Hour contract.
FP-LOE	Fixed-Price—Level-Of-Effort contract.
FPMR	Federal Property Management Regulations.
FPR	Federal Procurement Regulations.
FSC	Federal Supply Classification.
FSG	Federal Supply Group.
FSN	Federal Supply Number.
FSS	Federal Supply Schedule or Federal Supply Service (GSA).
FSTS	Federal Secure Telecommunications System.
FT Fund	A revolving fund, designated as the Federal Telecommunications Fund, used by GSA to pay for GSA-provided common-user services, specifically including the current FTS and proposed FTS 2000 services.

FTPS	Federal Telecommunications Standards Program administered by NCS; standards are published by GSA.
FTS	Federal Telecommunications System.
FY	Fiscal Year.
FYDP	Five Year Defense Plan.
GAO	General Accounting Office.
GFE	Government-Furnished Equipment.
GFM	Government-Furnished Material.
GFY	Government Fiscal Year.
GIDEP	Government-Industry Data Exchange Program
GOCO	Government-Owned, Contractor-Operated.
GOGO	Government-Owned, Government-Operated.
GOSIP	Government Open Systems Interconnection Profile.
GPO	Government Printing Office.
GPS	Global Positioning System.
GRH	Gramm-Rudman-Hollings Act (1985), also called Gramm-Rudman Deficit Control.
GS	General Schedule.
GSA	General Services Administration.
GSBCA	General Services Administration Board of Contract Appeal.
HCFA	Health Care Financing Administration.
HHS	(Department of) Health and Human Services.
HPA	Head of Procuring Activity.
HSDP	High-Speed Data Processors.
HUD	(Department of) Housing and Urban Development.
ICA	Independent Cost Analysis.
ICAM	Integrated, Computer-Aided Manufacturing.
ICE	Independent Cost Estimate.
ICP	Inventory Control Point.
ICST	Institute for Computer Sciences and Technology, National Institute of Standards and Technology.
IDAMS	Image Display And Manipulation System.
IDEP	Interservice Data Exchange Program.
IDN	Integrated Data Network.
IFB	Invitation For Bids.
IOC	Initial Operating Capability.
IOI	Internal Operating Instructions.
IPS	Integrated Procurement System.
IQ	Indefinite Quantity Contract.
IR&D	Independent Research & Development.
IRM	Information Resource Manager.
IXS	Information Exchange System.
JOCIT	JOvial Compiler Implementation Tool.
JSIPS	Joint Systems Integration Planning Staff.
JSOP	Joint Strategic Objectives Plan.

JSOR	Joint Service Operational Requirement.
JUMPS	Joint Uniform Military Pay System.
LC	Letter Contract.
LCC	Life Cycle Costing.
LCMP	Life Cycle Management Procedures (DD7920.1).
LCMS	Life Cycle Management System.
L-H	Labor-Hour Contract.
LOI	Letter of Interest.
LRPE	Long-Range Procurement Estimate.
LRIRP	Long-Range Information Resource Plan.
MAISRC	Major Automated Information Systems Review Council (DoD).
MANTECH	MANufacturing TECHnology.
MAPS	Multiple Address Processing System.
MAP/TOP	Manufacturing Automation Protocol/Technical and Office Protocol.
MASC	Multiple Award Schedule Contract.
MDA	Multiplexed Data Accumulator.
MENS	Mission Element Need Statement or Mission Essential Need Statement (see DD-5000.1 Major Systems Acquisition).
MILSCAP	MILitary Standard Contract Administration Procedures.
MIL SPEC	MILitary SPECification.
MIL STD	Military Standard.
MIPR	Military Interdepartmental Purchase Request.
MOD	Modification.
MOL	Maximum Ordering Limit (Federal Supply Service).
MPC	Military Procurement Code.
MYP	MultiYear Procurement.
NARDIC	Navy Research and Development Information Center.
NASA	National Aeronautics and Space Administration.
NCMA	National Contract Management Association.
NCS	National Communications System; responsible for setting U.S. Government standards administered by GSA; also holds primary responsibility for emergency communications planning.
NICRAD	Navy-Industry Cooperative Research and Development.
NIP	Notice of Intent to Purchase.
NIST	National Institute of Standards and Technology.
NMCS	National Military Command System.
NSA	National Security Agency.
NSEP	National Security and Emergency Preparedness.
NSF	National Science Foundation.
NSIA	National Security Industrial Association.

NTIA	National Telecommunications and Information Administration of the Department of Commerce; replaced the Office of Telecommunications Policy in 1970 as planner and coordinator for government communications programs; primarily responsible for radio.
NTIS	National Technical Information Service.
Obligation	Earmarking of specific funding for a contract from committed agency funds.
OCS	Office of Contract Settlement.
OFCC	Office of Federal Contract Compliance.
Off-site	Services to be provided near but not in government facilities.
OFMP	Office of Federal Management Policy (GSA).
OFPP	Office of Federal Procurement Policy.
OIRM	Office of Information Resources Management.
O&M	Operations & Maintenance.
OMB	Office of Management and Budget.
OM&R	Operations, Maintenance, and Readiness.
On-site	Services to be performed on a government installation or in a specified building.
OPM	Office of Procurement Management (GSA) or Office of Personnel Management.
Options	Sole-source additions to the base contract for services or goods to be exercised at the government's discretion.
OSHA	Occupational Safety and Health Act.
OSI	Open System Interconnect.
OSP	OffShore Procurement.
OTA	Office of Technology Assessment (Congress).
Out-Year	Proposed funding for fiscal years beyond the budget year (next fiscal year).
P-1	FY Defense Production Budget.
P3I	Pre-Planned Product Improvement (program in DoD).
PAR	Procurement Authorization Request or Procurement Action Report.
PAS	Pre-Award Survey.
PASS	Procurement Automated Source System.
PCO	Procurement Contracting Officer.
PDA	Principal Development Agency.
PDM	Program Decision Memorandum.
PDR	Preliminary Design Review.
PIR	Procurement Information Reporting.
PME	Performance Monitoring Equipment.
PMP	Purchase Mangement Plan.
PO	Purchase Order or Program Office.
POM	Program Objective Memorandum.
POSIX	Portable Open System Interconnect Exchange.

POTS	Purchase of Telephone Systems.
PPBS	Planning, Programming, Budgeting System.
PR	Purchase Request or Procurement Requisition.
PRA	Paperwork Reduction Act.
PS	Performance Specification - alternative to a Statement of Work, when work to be performed can be clearly specified.
QA	Quality Assurance.
QAO	Quality Assurance Office.
QMCS	Quality Monitoring and Control System (DoD software).
QMR	Qualitative Material Requirement (Army).
QPL	Qualified Products List.
QRC	Quick Reaction Capability.
QRI	Quick Reaction Inquiry.
R-1	FY Defense RDT&E Budget.
RAM	Reliability, Availability, and Maintainability.
RC	Requirements Contract.
R&D	Research and Development.
RDA	Research, Development, and Acquisition.
RDD	Required Delivery Date.
RD&E	Research, Development, and Engineering.
RDF	Rapid Deployment Force.
RDT&E	Research, Development, Test, and Engineering.
RFI	Request for Information.
RFP	Request for Proposal.
RFQ	Request for Quotation.
RFTP	Request for Technical Proposals (Two-Step).
ROC	Required Operational Capability.
ROI	Return on Investment.
RTAS	Real Time Analysis System.
RTDS	Real Time Display System.
SA	Supplemental Agreement.
SBA	Small Business Administration.
SB Set-Aside	Small Business Set-Aside contact opportunities with bidders limited to certified small businesses.
SCA	Service Contract Act (1964 as amended).
SCN	Specification Change Notice.
SDN	Secure Data Network.
SEC	Securities and Exchange Commission.
SE&I	Systems Engineering and Integration.
SETA	Systems Engineering/Technical Assistance.
SETS	Systems Engineering/Technical Support.
SIBAC	Simplified Intragovernmental Billing and Collection System.
SIMP	Systems Integration Master Plan.
SIOP	Single Integrated Operations Plan.
SNAP	Shipboard Nontactical ADP Program.

Sole Source	Contract award without competition.
Solicitation	Invitation to submit a bid.
SOR	Specific Operational Requirement.
SOW	Statement Of Work.
SSA	Source Selection Authority (DoD).
SSAC	Source Selection Advisory Council.
SSEB	Source Selection Evaluation Board.
SSO	Source Selection Official (NASA).
STINFO	Scientific and Technical INFOrmation Program—Air Force/NASA.
STU	Secure Telephone Unit.
SWO	Stop-Work Order.
Synopsis	Brief Description of contract opportunity in CBD after D & F and before release of solicitation.
TA/AS	Technical Assistance/Analysis Services.
TCP/IP	Transmission Control Protocol/Internet Protocol.
TEMPEST	Studies, inspections, and tests of unintentional electromagnetic radiation from computer, communication, command, and control equipment that may cause unauthorized disclosure of information; usually applied to DoD and security agency testing programs.
TILO	Technical and Industrial Liasion Office—Qualified Requirement Information Program—Army.
TM	Time and Materials contract.
TOA	Total Obligational Authority (Defense).
TOD	Technical Objective Document.
TR	Temporary Regulation (added to FPR, FAR).
TRACE	Total Risk Assessing Cost Estimate.
TRCO	Technical Representative of the Contracting Offices.
TREAS	Department of the Treasury.
TRP	Technical Resources Plan.
TSP	GSA's Teleprocessing Services Program.
TVA	Tennessee Valley Authority.
UCAS	Uniform Cost Accounting System.
USA	U.S. Army.
USAF	U.S. Air Force.
USCG	U.S. Coast Guard.
USMC	U.S. Marine Corps.
USN	U.S. Navy.
U.S.C.	United States Code.
USPS	United States Postal Service.
USRRB	United States Railroad Retirement Board.
VA	Depatment of Veterans Affairs.
VE	Value Engineering.
VHSIC	Very High Speed Integrated Circuits.
VIABLE	Vertical Installation Automation Base Line (Army).
VICI	Voice Input Code Identifier.

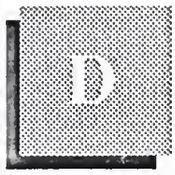
WBS	Work Breakdown Structure.
WGM	Weighted Guidelines Method.
WIN	WWMCCS Intercomputer Network.
WIS	WWMCCS Information Systems.
WITS	Washington Interagency Telecommunications System.
WS	Work Statement—Offerer's description of the work to be done (proposal or contract).
WWMCCS	World-Wide Military Command and Control System.
8(a)	Set-Aside Agency awards direct to Small Business Administration for direct placement with a socially/economically disadvantaged company.

B

General and Industry Acronyms

ADAPSO	Association of Data Processing Service Organization, now the Computer Software and Services Industry Association.
ADP	Automatic Data Processing.
ADPE	Automatic Data Processing Equipment.
ANSI	American National Standards Institute.
BOC	Bell Operating Company.
CAD	Computer-Aided Design.
CAM	Computer-Aided Manufacturing.
CBEMA	Computer and Business Equipment Manufacturers Association.
CCIA	Computers and Communications Industry Association.
CCITT	Comite Consultaif Internationale de Telegraphie et Telephonique; Committee of the International Telecommunication Union.
COBOL	COmmon Business-Oriented Language.
COS	Corporation for Open Systems.
CPU	Central Processing Unit.
DBMS	Data Base Management System.
DRAM	Dynamic Random Access Memory.
EIA	Electronic Industries Association.
EPROM	Erasable, Programmable, Read-Only Memory.
IEEE	Institute of Electrical and Electronics Engineers.
ISDN	Integrated Services Digital Networks.
ISO	International Organization for Standardization; voluntary international standards organization and member of CCITT.
ITU	International Telecommunication Union.

LSI	Large-Scale Integration.
MFJ	Modified Final Judgment.
PROM	Programmable, Read-Only Memory.
RBOC	Regional Bell Operating Company.
UNIX	AT&T Proprietary Operating System.
UPS	Uninterruptable Power Source.
VAR	Value-Added Reseller.
VLSI	Very Large Scale Integration.
WORM	Write-Once-Read-Many-Times.



Appendix: Policies, Regulations, and Standards

A

OMB Circulars	A-11	Preparation and Submission of Budget Estimates.
	A-49	Use of Management and Operating Contracts.
	A-71	Responsibilities for the Administration and Management of Automatic Data Processing Activities.
	A-109	Major Systems Acquisitions.
	A-120	Guidelines for the Use of Consulting Services.
	A-121	Cost Accounting, Cost Recovery, and Integrated Sharing of Data Processing Facilities.
	A-123	Internal Control Systems.
	A-127	Financial Management Systems.
	A-130	Management of Federal Information Resources.
	A-131	Value Engineering.

B

GSA Publications	The FIRMR as published by GSA is the primary regulation for use by federal agencies in the management, acquisition, and use of both ADP and telecommunications information resources.

C

DoD Directives	DD-5000.1	Major System Acquisitions.
	DD-5000.2	Major System Acquisition Process.
	DD-5000.11	DoD Data Elements and Data Codes Standardization Program.
	DD-5000.31	Interim List of DoD-Approved, High-Order Languages.
	DD-5000.35	Defense Acquisition Regulatory Systems.
	DD-5200.1	DoD Information Security Program.
	DD-5200.28	Security Requirements for Automatic Data Processing (ADP) Systems.

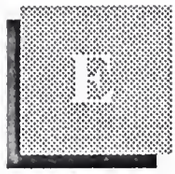
	DD-5200.28-M	Manual of Techniques and Procedures for Implementing, Deactivating, Testing, and Evaluating Secure Resource Sharing ADP Systems.
	DD-7920.2	Major Automated Information Systems Approval Process.
	DD-7935	Automated Data Systems (ADS) Documentation.

D

Standards

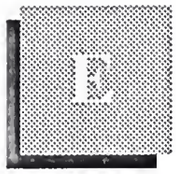
ADCCP	Advanced Data Communications Control Procedures; ANSI Standard X3.66 of 1979; also NIST FIPS 71.
CCITT G.711	International PCM standard.
CCITT T.0	International standard for classification of facsimile apparatus for document transmission over telephone-type circuits.
DEA-1	Proposed ISO standard for data encryption based on the NIST DES.
EIA RS-170	Monochrome video standard.
EIA RS-170A	Color video standard.
EIA RS-464	EIA PBX standards.
EIA RS-465	Standard for Group III facsimile.
EIA RS-466	Facsimile standard; procedures for document transmission in the General Switched Telephone Network.
EIA RS-232-C	EIA DCE to DTE interface standard using a 25-Pin connector; similar to CCITT V-24.
EIA RS-449	New EIA standard DTE to DCE interface which replaces RS-232-C.
FED-STD 1000	Proposed Federal Standard for adoption of the full OSI reference model.
FED-STD 1026	Federal Data Encryption Standard (DES) adopted in 1983; also FIPS 46.
FED-STD 1041	Equivalent to FIPS 100.
FED-STD 1061	Group II Facsimile Standard (1981).
FED-STD 1062	Federal standard for Group III facsimile; equivalent to EIA RS-465.
FED-STD 1063	Federal facsimile standard; equivalent to EIA RS-466.
FED-STDs 1005, 1005A-1008	Federal Standards for DCE Coding and Modulation.
FIPS 46	NIST Data Encryption Standard (DES).
FIPS 81	DES Modes of Operation.

FIPS 100	NIST Standard for packet-switched networks; subset of 1980 CCITT X.25.
FIPS 107	NIST Standard for local area networks, similar to IEEE 802.2 and 802.3.
FIPS 146	Government Open Systems Interconnection (OSI) Profile (GOSIP).
FIPS 151	NIST POSIX (Portable Operating System Interface for UNIX) standard.
IEEE 802.2	OSI-Compatible IEEE standard for data-link control in local area networks.
IEEE 802.3	Local area network standard similar to Ethernet.
IEEE 802.4	OSI-compatible standard for token-bus local area networks.
IEEE 802.5	Local area networks standard for token-ring networks.
IEEE P1003.1	POSIX standard, similar to FIPS 151.
MIL-STD-188-114C	Physical interface protocol similar to RS-232 and RS-449.
MIL-STD-1777	IP-Internet Protocol.
MIL-STD-1778	TCP - Transmission Control Protocol.
MIL-STD-1780	File Transfer Protocol.
MIL-STD-1781	Simple Mail Transfer Protocol (electronic mail).
MIL-STD-1782	TELNET - virtual terminal protocol.
MIL-STD-1815A	Ada Programming Language Standard.
SVID	UNIX System Interface Definition.
X12	ANSI standard for Electronic Data Interchange
X.21	CCITT Standard for interface between DTE and DCE for synchronous operation on public data networks.
X.25	CCITT standard for interface between DTE and DCE for terminals operating in the packet mode on public data networks.
X.75	CCITT standard for links that interface different packet networks.
X.400	ISO Application-level standard for the Electronic transfer of messages (electronic mail).



Appendix: Related INPUT Reports

A	
Annual Market Analyses	*U.S. Information Services Vertical Markets*
	U.S. Information Services Cross-Industry Markets
	Procurement Analysis Reports, GFY 1989-GFY 1994
B	
Industry Surveys	*U.S. Information Services Industry*
	Directory of Leading U.S. Information Services Vendors
C	
Market Reports	*Federal Microcomputer Market, 1989-1994*
	Defense Logistics Agency Information Services Market
	Federal Computer Security Market
	Federal Professional Services Market
	Federal Processing Services and Operational Support Markets
	Federal Software Products and Related Services Market



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	Federal Professional Services Market
	Federal Processing Services and Operational Support Markets
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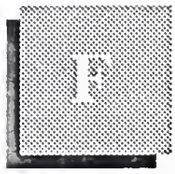

Appendix: Questionnaires

A Definitions

For this survey, we have defined Systems Integration as the following vendor-supplied products and services:

- Equipment
  - Information Systems
  - Communications
- Software Products
  - Systems Software
  - Applications Software
- Professional Services (during Contract)
  - Consulting
    - Feasibility and Trade-off Studies
    - Selection of Hardware, Networks, and Software
  - Project Management
- Design/Integration
  - Systems Design
  - Installation of Hardware, Networks, and Software
  - Demonstration of Testing
- Software Development
  - Modification of Software Packages
  - Modification of Existing Software
  - Custom Development of Software
- Education/Training and Documentation
- Operation and Maintenance (during Contract)
  - Equipment/Network Maintenance

- Software Maintenance
- Education and Training
- Network Management

• Systems Operations (during Contract)
- Replaces Facilities Management
- 'Ownership' with Customer
- Not-Shared Operations
- Transient Possibility

• Other Products/Services
- Data Processing Supplies
- Processing/Network Services
- Data/Voice Communication Services
- Engineering Services
- Other

B
Questionnaires

1. Federal Systems Integration Market

Industry Questionnaire

1. Does your company now provide, or plan to provide systems integration services to the federal government? **(check one)**

   Yes ❑
   No ❑ **(end)**

2a. What types of systems integration services does your company currently provide, and plan to provide to the federal market through FY 1993? **(check all that apply—refer to definition page)**

	Current	Planned
Software Development	❑	❑
Equipment	❑	❑
Software Products	❑	❑
Design/Integration	❑	❑
Professional Services	❑	❑
Education/Training and Documentation	❑	❑
Operation and Maintenance	❑	❑
Systems Operations	❑	❑
Other Products/Services	❑	❑

2b. As a system integrator, what functions does your company normally subcontract to other vendors? **(please be specific)**

_____

3. Approximately what percent of your company's federal systems integration business for FY 1988 was in each of the following categories? **(remember your responses should add to 100%)**

SI Category	Indicate Percent
Software Development	_____%
Equipment	_____%
Software Products	_____%

SI Category	Indicate Percent
Design/Integration	_____%
Professional Services	_____%
Education/Training and Documentation	_____%
Operation and Maintenance	_____%
Systems Operations	_____%
Other Products/Services	_____%

4. Which of the following reasons have influenced your company's decision to compete in the federal systems integration market for products or services? **(check all that apply)**

- Growth Potential ❑
- Past Systems Integration Success ❑
- New Technology ❑
- Profit Potential ❑
- Software Skill ❑
- Possess Diversity of Required Skills ❑
- Long Term Involvement ❑
- Other **(specifiy)**: _____ ❑

5. Which range best describes your company's total 1987 revenues (all divisions, all markets)? **(check one only)**

Less than $100 million
- $1 million - $25 million ❑
- $26 million - $50 million ❑
- $51 million - $75 million ❑
- $76 million - $100 million ❑

Greater than $100 million
- $101 million - $250 million ❑
- $251 million - $500 million ❑
- $501 million - $1 billion ❑
- Greater than $1 billion ❑

6a. Approximately how many employees are in your entire company? **(enter number)** _____

6b. How many employees are in your company's federal market division **(enter number)** _____

7a. In your opinion, do you believe the commercial systems integration market will increase, decrease, or remain the same through FY 1993? **(check one)**

- Increase ❑ by what percent? _____%
- Decrease ❑ by what percent? _____%
- Remain the same ❑

7b. Why?

_____

_____

8. Indicate which range best describes your company's 1987 revenues from each segment of the federal systems integration market listed below? **(for each category check one revenue range)**

	Market Segment Category								
Revenue Range	Software Development	Equipment	Software	Design/ Integration Products	Prof. Svcs.	Ed./ Training/ Doc.	Ops. & Mnt. Svcs.	Systems Operations	Other Products/
LESS THAN $100 MILLION									
$ 1 million - $ 25 million	❑	❑	❑	❑	❑	❑	❑	❑	❑
$ 26 million - $ 50 million	❑	❑	❑	❑	❑	❑	❑	❑	❑
$ 51 million - $ 75 million	❑	❑	❑	❑	❑	❑	❑	❑	❑
$ 76 million - $100 million	❑	❑	❑	❑	❑	❑	❑	❑	❑
GREATER THAN $100 MILLION									
$101 million - $250 million	❑	❑	❑	❑	❑	❑	❑	❑	❑
$251 million - $500 million	❑	❑	❑	❑	❑	❑	❑	❑	❑
$501 million - $ 1 billion	❑	❑	❑	❑	❑	❑	❑	❑	❑
Greater than $1 billion	❑	❑	❑	❑	❑	❑	❑	❑	❑

9a. Does your company forecast that its federal systems integration revenues will increase, decrease or remain the same through FY1993? **(check one)**

Increase ❑ by what percent? _____%
Decrease ❑ by what percent? _____%
Remain the same ❑

9b. Why?

_____

10. Which procurement approaches will your company pursue in the federal systems integration market? **(check all that apply)**

- Sole source seed jobs ❑
- Competitive niche jobs ❑
- IQID Requirements Contracts ❑
- Basic Ordering Agreements ❑
- Major SI opportunities ❑
- Other (specify): _____ ❑

11a. Indicate below how your company views systems integration oportunities by agency type: **(check one for each agency)**

Agency Type	Opportunities Increasing	Decreasing	Remaining the Same
DoD	_____	_____	_____
Civil	_____	_____	_____

11b. Please name the specific agencies that provide the most attractive systems integration opporunities for your company.

_____

_____

_____

12. In your opinion, what differences exist between the federal and commercial systems integration markets?

_____

_____

_____

13. How important do you believe each of the following factors should be in controlling vendor selection for systems integration contracts by federal agenceis? Use a 1-5 scale to rate each factor; 5 = crucial importance, and 1 = of no importance at all. **(read each factor, circle one response)**

Factor	Rating				
Technical Solution	1	2	3	4	5
Contract Type	1	2	3	4	5
Risk Containment Procedures	1	2	3	4	5
Initial Cost	1	2	3	4	5
Life Cycle	1	2	3	4	5
Other (specify):_____	1	2	3	4	5

14. Does your company perceive that any of the following factors will impact the federal systems integration market positively or negatively and why?

		IMPACT (check one)	
		Positive	Negative
a.	Budget Constraints? How/why? _____	❑	❑
b.	Democratic Administration? How/why? _____	❑	❑
c.	Republican Administration? How/why? _____	❑	❑
d.	New Technology? How/why? _____	❑	❑

DEADLINE FOR COMPLETED QUESTIONNAIRES IS _____

2. Federal Systems Integration Case Study

Prime Contractor Questionnaire

Program Name: _____

Department: _____

Branch/Office: _____

Agency: _____

Address: _____

_____

_____

Agency/Project Manager: _____

****

Prime Contractor Name: _____

Address: _____

_____

Contractor Interviewee: _____

Title: _____

Phone: _____

1. Please describe the mission problem/function that this systems integration contract was to solve/ fulfill? (**Example:** Agency was running a manual inventory system to ship 2.5M parts per year. The depot center was approximately 60,000 square feet. The agency forecasted growth in this requirement and automation was the only way to keep up with demand.)

   (specify mission): _____

   _____

2. What major tasks did your company perform as a systems integrator that were critical to the program's success? Please be specific. (Example: Designed a new depot center; designed and implemented a new computer system; designed and implemented a monorail system to transport parts within the depot; altered existing depot center to accommodate planned depot.)

   (specify tasks performed): _____

   _____

   _____

3. Please **specify** the following summary contract and schedule information:

a. Contract type: _____
b. Contract value: $ _____
c. Contract duration: _____
d. RFP release date: _____
e. Bid due date: _____
f. Contract award date: _____
g. Project completion date: _____

4. For this systems integration contract, **provide** the names of the subcontractors and functions they were responsible for:

Contractor	Company	Function
Subcontractor	_____	_____
Subcontractor	_____	_____
Subcontractor	_____	_____
Outside Consultant	_____	_____

For Questions 5 through 11, please describe the following project components of this systems integration contract in each category where applicable:

Equipment	(Check One) Agency Supplied	(Check One) Contractor Supplied
5a. Equipment: **(specify hardware make(s), model number(s), quantity)**		
_____	❑	❑
_____	❑	❑
_____	❑	❑

5b. **Enter** total $ value of IT equipment: $_____

Software

6a. **Specify** systems software type(s): _____

6b. **Specify** application software type(s): _____

_____

6c. **Enter** total $ value of applications software: $_____

Professional Services

7a. **Estimate** the total value of the professional services portion of this contract:

$_____

7b. For each professional service listed, indicate contractor responsibility. **(circle: P for Prime Contractor; S for Subcontractor; O for Other)**

	Circle One		
Consulting Services	P	S	O
Design/Integration	P	S	O
Project Management	P	S	O
Education/Training	P	S	O

Applications

8. **Specify which applications** were developed or modified for this project and **by which contractor(s)** for each software category.

a. Off-the-shelf: _____

b. Custom developed: _____

Operations and Maintenance

9a. **Estimate** the total value of the operations and maintenance portion of this contract:

$_____ **(enter value)**

9b. **Circle** which contractor had responsibility for operations and maintenance: **(circle: P for Prime Contractor; S for Subcontractor; O for Other)**

(circle one) P S O

Other Products and Information Services

10a. What was the $ value of other ADP products and information services in this contract?

$ _____ **(enter value)**

10b. **Specify** products and information services

_____

Other Noninformation Services

11a. What was the $ value of other non-information services in this contract? $_____ **(enter value)**

11b. **Specify** non information services:

_____

12. How would you rate your company's overall success in satisfying the user requirements of this systems integration contract so far? **(use a 1-5 scale: where 5=extremely successful; and 1=not successful at all)**

(circle one) 1 2 3 4 5

Additional comments: _____

_____

13. What funding was originally appropriated for this contract?

(specify amount) $ _____

14a. Did the scope of this project change from the contract award date? **(check one)**

Yes ❑
No ❑

14b. If Yes, how was this issue resolved with the federal agency?

Please explain: _____

_____

15. Please **detail** the current status of this systems integration contract:

_____

_____

PLEASE RETURN THIS QUESTIONNAIRE BY _____

3. Federal Systems Integration Case Study

Agency Questionnaire

Program Name: _____

Department: _____

Branch/Office: _____

Agency: _____

Address: _____

_____

_____

Program/Project Manager: _____

Phone: _____

Interviewee/Title: _____

1. Please describe the mission problem/function that this systems integration contract was to solve/fulfill? (**Example:** Agency was running a manual inventory system to ship 2.5M parts per year. The depot center was approximately 60,000 square feet. The agency forecasted growth in this requirement and automation was the only way to keep up with demand.)

   (specify mission): _____

   _____

   _____

2. What major tasks did your company perform as a systems integrator that were critical to the program's success? Please be specific. (**Example:** Designed a new depot center; designed and implemented a new computer system; designed and implemented a monorail system to transport parts within the depot; altered existing depot center to accommodate planned depot.)

   (specify tasks performed): _____

   _____

   _____

3. Please **specify** the following summary contract and schedule information:

   a. Contract Type: _____
   b. Contract Value: $ _____
   c. Contract Duration: _____
   d. RFP release date: _____
   e. Bid due date: _____
   f. Contract award date: _____
   g. Project completion date: _____

4. For this systems integration contract, **provide** the names of the contractors and functions they were responsible for:

Contractor	Company	Function
Prime Contractor	_____	_____
Subcontractor	_____	_____
Subcontractor	_____	_____
Outside Consultant	_____	_____

For Questions 5 through 11, please describe the following project components of this systems integration contract in each category where applicable:

Equipment

	Check One	
	Agency Supplied	Contractor Supplied
5a. Equipment: **(specify hardware make(s), model number(s), quantity)**		
_____	_____	_____
_____	_____	_____
_____	_____	_____

5b. Enter total $ value of IT equipment: $ _____

Software

6a. **Specify** systems software type(s): _____

6b. **Specify** applications software type(s): _____

_____

6c. **Enter** total $ value of applications software: $_____

Professional Services

7a. **Estimate** the total value of the professional services portion of this contract:

$ _____

7b. For each professional service listed, indicate contractor responsibility. **(circle: P for Prime Contractor; S for Subcontractor; O for Other)**

	Circle One		
Consulting Services	P	S	O
Design/Integration	P	S	O
Project Management	P	S	O
Education/Training	P	S	O

Applications

8. **Specify which applications** were developed or modified for this project and **by which contractor(s)** for each software category.

a. Off-the-shelf: _____

_____

b. Custom developed: _____

_____

Operations and Maintenance

9a. **Estimate** the total value of the operations and maintenance portion of this contract:

$_____ **(enter value)**

9b. **Circle** which contractor had responsibility for operations and maintenance: **(circle: P for Prime Contractor; S for Subcontractor; O for Other)**

(circle one) P S O

Other Products and Information Services

10a. What was the $ value of other ADP products and information services in this contract?

$ _____ **(enter value)**

10b. **Specify** products and information services:

_____

Other Noninformation Services

11a. What was the $ value of other non-information services in this contract?

$ _____ **(enter value)**

11b. **Specify** non-information services:

_____

12. How would you rate tyour agency's overall staisfaction with the results of this systems integration contract? **(use a 1-5 scale: 5 = extremely satisfied; and 1 = not satisfied at all)**

(circle one) 1 2 3 4 5

Additional comments: _____

_____

_____

13. What funding was originally appropriated for this contract? **(specify amount)**

$ _____

14a. Did the scope of this project change from the contract award datge? **(check one)**

Yes ❑
No ❑

14b. If Yes, how was this issue resolved with the contractor? **Please explain:**

_____

_____

_____

15. Please **detail** the current status of this sytems integration contract:

_____

_____

_____

PLEASE RETURN THIS QUESTIONNAIRE BY_____